The Chemical Age

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Notes and Comments

Patent Law and Chemical Plant

THE annual dinner of the British Chemical Plant Manufacturers' Association is always an occasion for serious discussion in the place of the more customary post-prandial mutual admiration, and it was a happy thought of the Association to ask Mr. C. Hollins and Mr. Heron Rogers to introduce the subject of foreign-owned patents at this year's dinner. It was very satisfying to be told that the object for which British law is framed in its industrial aspects, is to protect British industry against foreign competition. Foreign competition can take many forms. Against the straight competition such as may exist in any part of the world between one manufacturer and another we have no complaint. Even in our laws when framed for the deliberate purpose of assisting our own people, we are scrupulously fair—with a bias towards the foreigner. If we cannot compete against other nations because our manufacturing costs are too high, because our machinery is out of date, because our transport costs are excessive, that is our own fault and we know how to deal with it without legislation. But there is a form of subsidised competition against which no individual manufacturer or industry can fight and in regard to which the nation as a whole as represented by its Government must take action. Instances of this form of competition were given at the dinner and in this unfair competition patents play no small part.

Compulsory Licences and Revocation

IT is laid down in judgments as a guiding principle that the purpose of British patents must be to help British industry, whether those patents are taken out by a British subject or not. All too frequently patents taken out in this country by foreigners are purely blocking patents, the object of which is to prevent the development in this country of processes established or being established abroad.

Mr. Hollins emphasised the fact that in an action for compulsory licences and annulments the judge had to take into account not only an existing situation in regard to the possibility of establishing in this country an industry based on the patent under review but also whether it would have been possible to establish the industry in this country at the time when the patent was granted. Foreign patentees who operate or license their patents here are welcomed, but there are many who use the existence of a British patent standing in their name as a means for preventing the initiation of a British industry until their own is so firmly established that the equivalent British industry could not hope to survive.

There is another way in which non-licensing of patents reacts to the detriment of British manufacturers, and particularly of British plant manufacturers. It was pointed out by Mr. Reavell that applications for licences to import (duty-free) plant, that could perfectly well be made here, are frequently accompanied by the plea that it has been made an essential condition that unless the plant is bought from the foreign patentee, a licence to use the process will not be granted. That is a difficulty against which the law provides no safeguard other than an action for compulsory licence or for complete revocation. Mr. Rogers held that an action for revocation was easier to fight and cheaper to win than one for a compulsory licence, though Mr. Hollins did not advise revocation, which is purely destructive. It was pointed out that within the space of some twenty years only two successful actions for compulsory licences had been fought. On the other hand, this may not be because the law is ineffective. The power to sue for compulsory licence is a very valuable weapon for negotiation; there is no record of the number of instances in which it has been used successfully. Although the law gives a period of four years after the grant of letters patent before patentee can be called upon to give an account of the way in which he is using the monopoly which the nation has given him, the fact that according to the interpretation of the law the foreigner to whom such a monopoly is granted must not give preference to his own country in developing an industry based on the patent must have led to the early initiation of many British industries under fear of revocation that would otherwise never have been started.

Too Many Loop-holes

IT was generally agreed, however, that even with all these advantages, "the law is an ass." There are still too many loop-holes for those who do not play the game. It was generally agreed that there will be another Patents Amendment Act sooner or later. The British Chemical Plant Manufacturers Association be ready with a complete case to prompt the legislature. We can leave that in the efficient hands of Mr. Alliott, Mr. Davidson Pratt and their colleagues. Mr. Chorlton, M.P., raised an important point to which we would direct the attention of all engaged in chemical industry, whether they be manufacturers of plant or chemicals. Members of Parliament are not

generally masters of technicalities; they have the outlook of the Mother of Parliaments, but no knowledge. Unless those who wish to have their case argued supply members with the necessary facts, any action that may be taken on their behalf by Parliament is nearly certain to be ineffectual. We suggest that the chemical industry should keep Members of Parliament *regularly* informed of the state of the industry and its problems. The frame of mind so engendered, together with the information amassed, would be of the greatest service whenever chemical matters are discussed in the House of Commons.

Position of the Chemical Manufacturer

THE position of the chemical manufacturer remains to be discussed. In the general patent position there is little difference between the broad outlines and much of what has been said here will apply to either the maker of plant or of chemicals. The problems of the two, however, differ in type; one deals with plant and the other with processes. The chemical manufacturer has the special point of difference from the maker of plant in that he is the purchaser of the products of the plant maker. The interests of the two may at times appear to conflict. The chemical manufacturer wishes to buy a cheaper plant from abroad, which the plant manufacturer would like to make here. The interpretation of the law is that for revocation or compulsory licence to be granted the application must be proved to be in the interests of the nation as a whole. If it is not to the advantage of the chemical manufacturer (the consumer, in this instance) to grant the application, it is not granted even though the plant maker may press hard for it.

The chemical manufacturer should be governed by a wider view. We do not maintain that no plant should ever be bought abroad—that would be a negation of international trade which cannot be for the ultimate good of the world. The chemical industry is continually in need of new plant. British plant manufacturers are second to none; it is a prime necessity for the welfare of the industry in peace and war that it should have behind it a really efficient body of firms capable of supplying its needs. The difficulties engendered by the absence of a home source of chemical glassware in 1914-1918 are too fresh in the memory of the chemists of those days to be readily forgotten. If plant be ordered abroad there will be neither incentive to develop new manufactures nor the technical skill to undertake them. Chemical manufacturers will not purchase abroad unless the British Chemical Plant Manufacturers Association finds itself unable to supply an equally good article, and even then every opportunity will be given to our plant manufacturers to make repeat orders, when required.

Better Ways for Handling Acid

THERE is scarcely a week which passes without some improvement being announced for the benefit of those who operate chemical plant. It may be a minor matter, or yet some outstanding development which will ultimately claim more than the usual amount of publicity. "A better way has been found," it is whispered from one to another, and the alert manufacturer or engineer is quick to listen to details. Any single one of these new ways may ultimately become standard practice at no far-distant date; alternatively, they may take time to develop, or may even fail as many have failed before them. The old method of handling acids in carboys, for instance, has yielded a "better way" where acids are used in bulk, for they may be conveyed and stored in specially-lined tanks of large capacity, from which discharge and distribution to various parts of the works is effected through pipework of similar nature with the aid of compressed air or (where possible) by influence of gravity. Where carboys are still used, especially in those cases where a limited amount of acid is in question, there are several possible methods which can be adopted for emptying the carboy. The carboy tilter is convenient to use where the acid is to be removed in small quantities. In other cases consequent danger in handling can be avoided if the acid is piped direct from the carboy to a small storage tank or receiver at the point where it is needed. This can be done by compressed air in two ways. For instance, a special device is on the market which uses air pressure inside the carboy but avoids the danger of bursting by also maintaining an equal air pressure outside the carboy. Alternatively, an air siphon pump can be used, one connection being made to the air main, one to the carboy and one to the acid receiver. Compressed air valves for acid handling equipment should be automatically closed by a spring, so that if the operator has his attention diverted elsewhere the air flow and acid flow will immediately cease.

Science and Trade

MR. TIZARD, in his recent address to the Science Masters Association reached a subject upon which we have in the past had something to say. "Was it merely a coincidence, or was it of fundamental significance," he said, "that the greatest industrial depression the world has ever known has taken place in the period of the most intense activity of the scientific man, both in the pursuit of knowledge for its own sake, and in the application of the results of that pursuit for industrial ends?" It is an inspiring thought for those who are teachers that though this increased power put into our hands by research may be applied by the world equally for good or for evil, which use will prevail will depend on education.

The application of science to industry has to a great extent displaced the old-time craftsman; much of the accusation levelled at science, that it has destroyed skill, is based on the meaning given to "skill" by the world from the dawn of history, that is to say, the ability of the individual to produce unaided articles of beauty or usefulness. Many people have not realised that one of the principal feats of science is to take the word "unaided" out of that last sentence. Science has enormously increased the size of the tools used by man, the only tool-using animal. There can be no doubt that Mr. Tizard is right in his broad contention that science increases wealth and improves the distribution of wealth *if and when the improvements made possible thereby are put into effect.* In times of prosperity there is an inertia in industrialists which causes those who are making profits to remain satisfied with their methods and prevents the application of the discoveries of science.

Patent Law in Relation to Foreign-Owned Patents

Chemical Plant Manufacturers' After-Dinner Discussion

PATENT law in relation to foreign owned British patents formed the subject of a valuable discussion which took the place of the formal toast list at the annual dinner of the British Chemical Plant Manufacturers' Association, at Jules Restaurant, Jermyn Street, London, on January 25. Mr. Eustace A. Alliott, chairman of the Association, presided, and amongst those present were Dr. F. H. Carr, chairman of the Association of British Chemical Manufacturers, Sir Frank Smith, secretary of the Department of Scientific and Industrial Research, Dr. J. T. Dunn, president of the Society of Chemical Industry, Mr. G. S. Whitham, of the War Office, Mr. L. W. Meekins, representing the United States Government, Mr. A. E. L. Chorlton, M.P., president of the Institution of Mechanical Engineers, Mr. C. le Maistre, director of the British Standards Institution, Mr. H. J. Pooley, secretary of the Society of Chemical Industry, Mr. F. A. Greene, hon. treasurer, and Mr. H. W. Cremer, hon. secretary of the Institution of Chemical Engineers, Mr. P. Catling, of the Import Duties Advisory Committee, Brig.-Gen. Magnus Mowat, secretary of the Institution of Mechanical Engineers, Mr. W. A. S. Calder, chairman of the Chemical Engineering Group, and Mr. D. MacDonald, hon. secretary of the Chemical Engineering Group.

The CHAIRMAN, in welcoming the guests, made sympathetic reference to the untimely death of Professor W. E. Gibbs, who, he said, used to help the Association in regard to the information issued to its members every month.

British Plant for British Industry

The Association, continued the chairman, was formed 13 years ago with 20 members and the number had now climbed to 50, including all the more important chemical plant manufacturers in the country. It tried in every way to foster the production of every kind of chemical plant in this country that might be needed by the user here. It came into being specifically to work in co-operation with the Association of British Chemical Manufacturers, and the general manager of that association was its secretary. The fact that Dr. Carr, chairman of the Asscociation of British Chemical Manufacturers, was present, was proof of the friendly feeling existing between the two associations. In co-operation with the Association of British Chemical Manufacturers they had appointed several committees and had had some informal conferences with various groups to discuss chemical plant and other problems of the industry. The Association had also enabled members to keep in touch with Government Departments, which was very valuable in connection with the Import Duties Advisory Committee and in other connections.

Referring to the subject selected for discussion, Mr. Alliott said that in 1932 the Finance Act empowered the Import Duties Advisory Committee to recommend the granting of free licences in the case of plant and machinery not manufactured in this country. The idea of that was to safeguard the interests of the British manufacturer so that he should not be hindered in competition with the foreigner by the fact that he could not obtain certain items of plant in this country, or alternatively that he had to pay a very high rate of duty for it. The rate of duty on chemical plant was for the most part 15 to 20 per cent. That might prove a serious handicap where plant was not obtainable in this country and the Association was able to do quite a lot of work in securing that plant was manufactured here which might otherwise come from abroad.

Fundamental Commonsense

One difficulty had been that the British plant manufacturer had often been unable to obtain sufficiently detailed information as to whether the type of plant wanted was the sort he could make, but there had been a great improvement in that direction and the board had issued fresh forms which made it much more difficult for anyone to make an application without giving a reasonable amount of information. It was satisfactory to the Association that the Department had consistently taken up an attitude which was helpful to the British plant manufacturer. Not being politicians, they were able to use in their duties a certain amount of fundamental British commonsense.

In many applications for these free licences it was said that the plant could not be obtained in England because there were patents which were owned abroad, in Germany or elsewhere, and the user very often put that forward as a reason for bringing in plant from abroad. The Association did not think this was a valid reason at all, because in most cases all its members needed was a licence under which tney could quite well make machinery here. It had been said from time to time that the plant was so special and the demand so small that it was not worth while to tackle its manufacture but in many cases there were patents on small matters; on the strength of those patents the foreigner was trying to force his plant into this country and prevent the British engineer from manufacturing it. That was the position they felt should be altered. German plant manufacturers were taking every possible step to avoid granting licences to manufacture their plant in this country and would only do so as a last resort Those manufacturers brought every pressure they could to bear on the British user of the plant to induce him to approach the Import Duties Advisory Committee and try to influence them to grant a free licence on the strength of those patents. They believed that recent Patent law had put a number of remedies within the reach of the British manufacturer whereby he could approach the Comptroller and secure a compulsory licence. The whole subject was a very difficult one and one of the objects of the present discussion was to try to make the position clear.

A Review of Patent Law

MR. C. HOLLINS, patent expert to Imperial Chemical Industries, Ltd., in opening the discussion, gave a brief survey of those provisions of the Patents Acts intended to safeguard the British manufacturer from undue oppression by the grant of patents to foreigners, which provisions now form Sections 37 and 38 of the Acts. The basis of the present Section 37 was that in certain circumstances a patentee might be held to have abused his monopoly and appropriate remedies for such abuse were prescribed. The spirit of the provisions was seen from the proviso to sub-section (2) which asserted that patents were granted not only to encourage invention but to secure working in the United Kingdom without undue delay.

As to how the British manufacturer could avail himself of the provisions of Section 27 against the foreign patentee, very few applications had been made under the Section, and only two of these had been successful. It must not be imagined, however, that that meant that our manufacturers were unenterprising or that the Section was ineffective. Rather was the lack of reported cases due to the effectiveness of the provisions as a lever to compel negotiations and the grant of licence without recourse to the courts. It was not to be expected, however, that a licence could be extracted in that way when the patentee knew he was well within the law in refusing one. To secure one of the five possible remedies the British manufacturer must bring his case within one of six sets of circumstances which constituted an abuse of monopoly.

Abuse of Monopoly

The six sets of circumstances were (i) non-working; (ii) United Kingdom manufacture prevented or hindered by importation; (iii) demand in the United Kingdom not adequately met on reasonable terms; (iv) refusal of licence on reasonable terms prejudicing British industry; (v) conditions attached to licence unfairly prejudicing British industry, and (vi) the patent monopoly used unfairly to prejudice the manufacture, sale or use in the United Kingdom of starting materials for a patented process.

The first condition must be understood in a wide sense, namely, that the British public had not had the benefit of

the invention. An example might be patents for machinery or plant the real benefit of which was not in the manufacture of the new machine or plant but in the facilitation of the processes for which they were intended. Obviously if the patentee made the machines or plant abroad and sold them at reasonable prices in the United Kingdom it would be difficult for anyone to argue that the British public did not get substantially the whole benefit of the invention in this country. The case was different when the subject of the patent was an article of general demand. There was then a definite obligation on the patentee to establish manufacture in the United Kingdom.

The second condition was a relic of the older 1883 and 1902 Acts which provided for revocation of the patent if the article was made principally abroad. In its new form it had not yet been interpreted by the courts, but it might be asserted that in order to be sure of succeeding on this ground the applicant must be prepared to prove that the patent monopoly had been used actively to encourage importation of the patented article to the practical exclusion of home manufacture. It was to be noted that importation of foreign infringing articles counted against the patentee unless he took action. On the other hand, infringement in the United Kingdom might save his patent if he took no action, for in that case the patent had not been used to prevent manufacture in this country.

Hedging and Improver Patents

The third condition was of limited application and could not be urged in any case where the patented article was freely sold in this country at a price which in all the circumstances was not exorbitant. It was legitimate for the owner of a useful invention to protect his monopoly by surrounding his main patent with a number of "hedging patents" covering various alternatives which might otherwise be used by competitors who were barred from the preferred method. It would be idle to argue that the patentee was called upon to work each of these variations or lose the corresponding patents. The demand was obviously met if the article covered by the main patent was available. The case of "improver patents" was not quite so simple and must always be one of degree. An inventor must never assume that because he had improved an article he was entitled to a licence under the main patent which dominated his. Inventors who obtained increased efficiency by a small alteration in the design of a condenser or who discovered a chemical which improved the washing power of water when used with a patent scrubber, or who found a patentable way of simplifying a dearsenicator which halved its cost, however, must be content with the bargaining power their inventions gave them, and could not demand a compulsory licence from the original patentees. The only clear case of this sort he could think of where an application for a compulsory licence was practically certain to be successful was where the second invention was in a different field from the master patent but depended on the latter for one of its starting materials.

Having read extracts from reported cases under the fourth condition, Mr. Hollins said that under the fifth condition, apart from Section 38, the unfair circumstances mentioned in the Acts must mean conditions showing that the monopoly was being used to favour foreign manufacture as against British manufacture. Short of this, and excepting the effect of Section 38, a patentee could impose any conditions he liked on his licencees.

The provision referred to under the sixth condition, and the corresponding remedy, were inserted in the 1932 Act on pressure from the Association of British Chemical Manufacturers. Their application was entirely to process patents, to chemical patents in fact, and they had little bearing on the problems of the chemical plant manufacturer.

Compulsory Working

Section 27 of the Act of 1907 introduced a modified form of compulsory working into the British law. This requirement was, however, suspended by the Act of November 23, 1915, and by the Act of 1919 it was revoked and replaced by an entirely new set of conditions which also operated in lieu of the Compulsory Licence Section 24 of the Act of 1907. These were again amended by the Acts of 1928 and 1932. Applications for compulsory licences had never been numerous. Under the older law the cost was prohibitive and the result very uncertain. Various amendments of the law had been made from time to time with a view to lessening the expense, but without any definite effect in that direction. Probably the existence of the possibility of obtaining a compulsory licence was more useful indirectly as tending to make patentees more amenable to reasonable offers.

With regard to the present law on the subject, it had been decided that it was necessary for the applicant to show that British trade as a whole had been prejudiced by the action or inaction of the patentee. In an instructive judgment delivered by Mr. Justice Luxmore in an application for a compulsory licence by the Brownie Wireless Co., Ltd. (1929 XLVI R.P.C. 457), whereby he reversed the decision of the Comptroller, the following definitions were given: "Trade of any person" refers to the existing trade of an applicant for the licence. The desire of the applicant to enter a trade is not the "establishment of a new trade or industry." "Public interest" is to be construed in its widest meaning and not simply with regard to the purchasing public. Prohibition against export is not an unreasonable condition and (in the circumstances of the particular case in question) the demand for royalties on unpatented as well as patented articles was not in restraint of trade and not unreasonable where the unpatented would compete with the patented articles. In another case (application for compulsory licence by Loewe Radio Co., Ltd., 1929—XLVI R.P.C. 479) where the patentees had offered a licence, held to be reasonable, a compulsory licence was refused.

In conclusion, Mr. Hollins emphasised that the key to the whole matter lay in each case in the answer to the question: Has the monopoly been used by the patentee to favour foreign and discouraged British manufacture?

A Monument of English Justice

MR. F. H. ROGERS said that in his view three courses were open to residents in this country to relieve the situation so far as manufacture and monopoly were concerned. First they had the right of voluntary agreement with the patentee; the right of coming to some arrangement with the person who had the monopoly. Secondly, they could apply for a licence under the patent, in which case they could go to the Comptroller and say the monopoly had been abused; but in that case they had to wait three years. Thirdly, they could apply for the patent to be revoked but that was a destructive course. That would leave it open for any person to work the process if he so chose. If he chose to say that the patent had been abused he had really got to show that abuse had taken place, because the section of the Act was so drawn as to be extremely fair to the foreigner and the burden upon the Comptroller was such that the claims were equally adjusted on both sides. In his opinion the patent law was a monument of English justice because it gave the patentee abroad an equal right with the applicant for the licence. It was not a difficult matter to get a patent revoked, but it was difficult to get a licence for abuse. Destruction did not get them anywhere. Recently there had been revoked two or three patents which had pressed hard on the community. These were types of patent which it was far better to revoke. It was essential to protect the manufacturer in this country so that he could benefit from the improvements which had been brought by monopolies within the realm.

Ridiculous Terms

MR. J. ARTHUR REAVELL said the difficulty which was being discussed that night was one which they were all up against. If the foreign manufacturer came to England and approached the chemical manufacturer to apply to the Advisory Committee in order to get some plant into this country free, the chemical manufacturer came to the Committee and said that unless he was allowed to buy his plant from Germany he could not make his chemicals and therefore make the sales that he was hoping to get abroad. Then the chemical manufacturer approached the plant maker and asked what about the licence to make the plant and it transpired that the licence asked for cost more than the price of the plant that was being sold. They were sometimes

approached by the foreigner with a view to making plant in this country. Certainly they could make terms, but the terms in many cases were perfectly ridiculous. The British maker could produce better plant than the foreigner and he hoped the chemical industry would give them the chance.

MR. K. FRASER said his experience had been similar to that of Mr. Reavell. They had been faced with entirely inadequate information as to the particular types of plant which were going to be imported into this country. He felt in most cases they could have made the plant here if they had been given the opportunity, but they were not given the chance of discussing the type of equipment that was needed. His feeling was that the question of licences could be arranged far more equitably than it was at the present time. He knew of many cases where plant had been supplied to chemical manufacturers in this country at figures which were double those for which the British plant manufacturer could have supplied the plant.

Sympathy in Parliament

MR. A. E. L. CHORLTON, M.P., said his view as a Member of Parliament was that representatives of engineering were not given sufficient information to enable them to reach satisfactory decisions. They could not, of course, discuss these matters widely at any time they liked, but there was always an opportunity to do so by way of questions which provided the facility to ask anything they liked. These difficult points which had been raised that evening could be gone into in full detail if only they had sufficient information placed before them. He had found that whenever such questions were raised there was a great willingness to listen and the more they did this the more they would be appreciated and listened to. In the last Patent Act a very good case prepared by Mr. Hollins was put forward by the Association of British Chemical Manufacturers and the case was ably handled in the House by Sir Christopher Clayton, and provided a really wonderful example of how things could be done. Nearly all the amendments that he brought forward were accepted.

MR. L. W. MEEKINS, U.S. Department of Commerce, said the problem was one which concerned the United States just as much as it did Great Britain. At present they had no law to compel a patentee to work a patent in the United States within a given time and he thought they might very well study what had been done in Britain.

Another Amending Bill

MR. HOLLINS, in replying to the discussion, said the general feeling was that the Patent Act as it stood at present was very fair, but possibly too generous to the foreigner. It must not be forgotten that these provisions of the Patent Act only dated from 1907. The statute as they now had it was really the 1919 Act, together with the small additional section, namely, the user patents section. He believed there would be another patent amendment Act in the near future and he would be very pleased if that meeting had been the means of bringing some of them to think about the problem which had been put before them that night. He hoped some suggestions would be forthcoming from the facts which he had set before them. He agreed that the British manufacturer was quite capable of making plant equal to the foreigner but there was the patent against him and it seemed to him that there was a difficult problem to solve. On the point of revocation he would like to refer to Mr. Reavell's remark about the German patent versus British patent. It had always been his opinion that if a man was able to get a patent in Germany then they must respect his British patent, but if he had failed to get one in Germany he would very strongly recommend them to have a serious look into his British patent as it was probably invalid.

MR. J. DAVIDSON PRATT briefly referred to the importance of taking out patents for the new inventions produced by British brains and money, so that at a later date British industry might not be prevented from using their inventions owing to the action of the foreigner in hedging the original invention round with subsidiary patents, as so often happened.

The proceedings concluded with a vote of thanks to the chairman.

Continental Chemical Notes

A NEW ROUMANIAN FACTORY is now under construction by the Marasesti Co., for the manufacture of copper sulphate.

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A NEW TEXTILE FIBRE incorporating flax and rayon is reported to have been developed by the joint efforts of the Glanzstoff concern and leading members of the Silesian textile industry. Marked stimulus to the Silesian flax industry is expected to result.

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DISCUSSING THE ACTIVITIES of the du Pont concern in South Eastern Europe, the " Metallbörse " reports that in the event of tariff difficulties seriously interfering with their plans, steps will be taken to establish manufacturing plants in Roumania and Greece.

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EXPERIMENTS CARRIED OUT by A. Jores, in Rostock, have led to the discovery of the identity of the hormone of nocturnal vision with the substance (intermedin) isolated by Zondek from the human pituitary gland. This discovery may be exploited in the treatment of night blindness.

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LINEN AND COTTON FABRICS can be distinguished on the basis of the distinctive fluorescence induced on exposing the quinosol-impregnated materials to ultraviolet light. The method originates from E. Grünsteidl (" Chemiker-Zeitung," January 27). The fabric is soaked in 5 per cent. quinosol solution, well washed and brought into 5 per cent. soda solution before irradiation with filtered ultraviolet light. Linen then exhibits a bright canary yellow fluorescence in contrast to the dark violet of cotton, even in the mercerised form. The effect is even more vivid if the soda-treated textiles are again washed and treated with zinc sulphate since the zinc salt is more actively fluorescent.

FORMALDEHYDE is to be manufactured in Budapest by the Acetic Chemical Works, reports the " Chemische Industrie."

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FINANCIAL DIFFICULTIES are reported, according to the Neue Freie Presse, to be holding up plans for a projected new wood carbonisation plant in Austria.

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THE GERMAN BEMBERG CONCERN, manufacturers of cuprommonium rayon, report improved business in 1933 in comparison with the previous year.

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THE ISOLATION IS ANNOUNCED of the first naphthenic acid of exactly defined chemical constitution in the shape of 3. 3. 4—trimethylcyclopentenyl—acetic acid. A full account of the work of Braun, Mannes and Reuter in this important department of petroleum chemistry appears in " Berichte," 1933, page 1,409.

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ALUMINIUM WILL BE PRODUCED in Sweden by the A/B Svenska Aluminiumskompaniet at a new factory at Mansbo in quantity sufficient to meet Swedish requirements. Energy will be derived from the local works of the Swedish Match Co. and the raw material (aluminium oxide) will be supplied by the Norsk Aluminium Co.

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MAGNESIUM METAL in the form of shavings has been proposed (" Chemiker-Zeitung," January 24) for water treatment filters. It simultaneously dechlorinates highly chlorinated water, removes free carbonic acid and imparts the alkaline reaction desirable in boiler feed water. It is highly economical in use and the minute traces of magnesium compounds going into solution need not cause any concern since almost all natural waters and drinking waters contain traces of magnesium salts.

Refrigeration in the Food Industry

A Symposium on Present-Day Practice

A NUMBER of papers dealing with refrigeration in the food industry were presented at a joint meeting of the British Association of Refrigeration and the Food Group of the Society of Chemical Industry, held at the Institution of Mechanical Engineers, London, on January 24. Professor Mottram presided, and was supported by Dr. J. T. Dunn, president of the Society of Chemical Industry.

At the commencement of the meeting, a silent tribute was paid to the late Sir William Hardy (a past-president of the British Association of Refrigeration), whose death was announced that day. Sir William had been closely associated with low-temperature research for a number of years.

Refrigeration in Food Production

The first paper presented was entitled "Refrigeration in the Food Industry," the author being Mr. P. Bilham. The food industry, he said, had been for years the largest user of refrigeration and although many new uses for mechanical refrigeration have recently become manifest the proportion employed in this country is small compared with that used for food conservation. An estimate of the cold storage space in the country shows a capacity of approximately 50,000,000 cu. ft. The use of refrigeration in production is mainly confined to ice-cream, but this is an important and growing industry. Two further uses of refrigeration in production occur in the conditioning of home-killed beef by hanging over ten to twelve days at a temperature of 37° F. (found definitely to increase the palatability of the meat), and in the dehydration or concentration of liquids by freezing out the water, which is recently receiving the attention it deserves. Apart from the simple method of storage in a chilled or frozen condition there are now the methods which combine this with auxiliary aids, such as the replacement of part of the air in the store by other gases, the use of packages or cans or exclude air, and the addition of sugar, or syrup, or brine in barrels or cans.

When the uses of refrigeration in the service of food are considered the difficulties occur mainly on the refrigeration side, but the scientific problems are very obscure if not particularly important. The effect of the temperature of chilled foods upon their flavour cannot be studied until we know upon what physiological processes flavour depends. In the meantime it is interesting to note that whilst some beverages gain markedly by chilling, such as fruit drinks and beer, others, such as wines, only reveal their true and characteristic flavour when served at normal temperatures. It might be considered that this merely depended on the volatility of certain organic compounds in these commodities, but it is a totally different matter if ice-cream is considered. This before freezing is sickly, oversweet and repellent.

Quick Freezing Methods

The lower temperatures of freezing and storage, said Mr. Bilham, now demanded also call for bigger efforts if they are to be effected with economy. For instance, there is the Birdseye system of quick freezing in which brine in large quantities is in regular use at a temperature of −45° F. and yet the process is commercially successful. Stores of quick frozen goods are maintained at −20° F. and this also demands efficiency if it is not to become unnecessarily expensive. The tendency to put on the market smaller and smaller household refrigerators has been the cause of new materials being introduced for refrigeration and insulation. In the first case it is possible to cite dichlor-difluor-methane with its notable properties of non-inflammability, non-toxicity, and good thermodynamical properties; in the second case, cellular rubber, of excellent insulation properties, which is very much lighter than cork.

The second paper, by Mr. H. W. Pasteur, related to "Methods of Refrigeration." Immense strides, said the author, have been made in the region of air cooling by forced circulation over cooling batteries, with resultant reduction in weight and size of coolers for a given cooling effect. One very simple discovery has been that by placing cooler piping across the flow of the air instead of along it, a very much better conductivity is obtained. This has led to the development of a whole series of different types of compact cooling batteries. More attention has also been paid to the humidity conditions in refrigerated rooms. The maintenance of the best humidity conditions are linked up with the characteristics of the goods in store, the design of cooling system, and the temperature of the cooling medium chosen.

Meat imported into England is either chilled or frozen in the meat works in the country of origin immediately after slaughter. A system of chilling often used now is to force down the temperature in one step as rapidly as possible by bringing the warm meat straight into the chilling rooms, avoiding intermediate steps at higher temperatures. This rapid and immediate application of refrigeration really applies to any food product and its object is to fix the product in a non-perishable state at the best moment and with a minimum of alteration to its condition during the process. The most usual method of chilling is by cooling lofts into which cold brine is sprayed. These lofts placed high up in the roofs are designed to ensure a good natural circulation of air, the cold air falling and the heat from the carcases rising up to the lofts. This method has been found so far to give the best humidity conditions to prevent undue shrinkage of the meat.

Chilled Meat and Frozen Meat

Meat can be kept fresh and edible without any ice formation at a chill temperature of about 29° F. for about 30-35 days. After this it starts to deteriorate. The voyage from South America takes about 19 days. It is partly due to this short transit period that roughly 5,000,000 quarters of chilled beef are imported annually into this country from the Argentine and Uruguay. Up to the present time the most usual method of transporting this meat by sea has been to hang it from rails in insulated holds which are cooled by grid piping fixed on the overhead and bulkheads. Cold brine is circulated through these grids at a temperature of about 12° F. to 15° F.

Although beef is in some cases frozen, it is chiefly mutton and lamb which are frozen solid, thus having all their latent heat extracted. They do not, like beef, suffer in texture and flavour due to the process of freezing and thawing off. They are brough over and stored at a temperature of +15° F. Variations of a few degrees above or below are not of great importance, nor is the method of cooling the spaces. Generally speaking, cooling grids are used without forced air circulation. One big advantage in freezing is that the meat can be stacked without harm. Chilled meat, on the other hand, must be hung and consequently takes up more space.

While cold storage on the ordinary system has thus proved of great benefit to the enterprising grower in this country, as it has proved the salvation of the grower abroad, mention should also be made of a comparatively new development in technique which has now reached a commercial basis and holds out prospects of wide application. This system, which is called "gas storage," involves the control of the atmosphere in the storage chamber, but it must not be supposed that it dispenses with the necessity of refrigeration, the actual temperature required being only a few degrees higher than under ordinary cold storage conditions. It has been found that the replacement of part of the oxygen content of the atmosphere by an equivalent amount of carbon dioxide, together with the maintenance of a low temperature, has an even greater effect in retarding the life cycle of an apple than can be obtained under ordinary cold storage conditions. This effect is noticeable in the colour of the fruit stored under these conditions and in the increased length of life of the fruit after removal from storage, which is an important factor in its distribution.

A temperature of about 40° F. gives the best results with gas stored apples, and the most successful method of cooling has been found to consist of an evenly distributed moderate

forced circulation of the atmosphere by means of a fan blowing over a specially-designed cooling battery. In many cases derelict oast houses have been converted into fruit stores. Some of these stores of as much as 36,000 cu. ft. capacity have refrigerating plants which are entirely automatically controlled.

Mr. JONES asked for information concerning the deposition of brine from the point of view of corrosion. For instance, he said that where caustic soda was used in calcium chloride brine there was liability to deposition of the brine.

Mr. R. J. CRACKNELL said there was no doubt that the dry compression system resulted in very great improvement in the operation of plants. Most of the existing refrigerating plants could be altered to that system, and as a rule it would result in increasing the refrigerating capacity by 25 to 33 per cent., or even more. The shell and tube apparatus was a very old type, but for many years no one in this country would use it, because they feared the freezing of the brine, and this was a real risk; it might freeze solid in the tubes. One could provide for an alarm to be given if the vapour pressure fell too low, and that type of plant was highly efficient; one could also provide any required velocity of the brine.

Mr. SMITH suggested that if more attention was paid to the evaporator and more even distribution from the coils in the cold room there would be less humidity of the atmosphere which was responsible for trouble in regard to the storage of meat in cold rooms.

Mr. D. M. FREELAND, referring to the coolers, asked what danger there was of ammonia escaping into the brine, and he also inquired if Mr. Pasteur could give a figure of the amount of ammonia per hundred thousand parts of brine, where shell and tube coolers were used.

Corrosion from Calcium Chloride Brine

Mr. PASTEUR, replying to the discussion, said that commercially speaking there was not very much complaint about corrosion from calcium chloride brine, and he did not recommend putting in caustic soda. On the other hand, with sodium chloride brine it was necessary because corrosion took place unless caustic soda was used. If the pipes, however, were kept always immersed in the calcium chloride brine the amount of corrosion was not serious. As to the freezing of the brine, the concentration of the brine came in and so long as it was concentrated enough to avoid any risk of freezing at ordinary working temperatures it was quite a safe system to operate. Automatic control was very often used which ensured the shutting down of the plants when excessively low temperatures were used. It was impossible, said Mr. Pasteur, to give a figure for the amount of ammonia per hundred thousand parts of brine; there was very little risk of escape of ammonia from shell and tube coolers and these had been used for a very long time without giving any trouble.

The third paper dealt with " Inspection " in regard to the refrigeration of food. The author, Dr. C. F. White (Medical Officer of Health for the Port of London), stressed that there are no regulations prescribing the method of packing of refrigerated meat, although it is clear that it is in the interests of merchants to arrange that such imports as offal, boneless meat, etc., shall be so packed that inspection is possible without previous thawing of the goods. If boneless beef, kidneys, livers, etc., are frozen in a solid mass it is quite impossible to carry out any inspection at all until the mass has been thoroughly thawed out and separated into its component parts. This, of course, leads not only to delay but to deterioration of the meat. A number of recommendations have, of course, from time to time been made for the guidance of merchants, for example, it is recommended that internal organs should be frozen separately and be packed in layers not more than two organs deep so that at least one side of each organ is open to inspection without unpacking.

Extensive decomposition of meat cargoes is now seldom seen, thanks to the perfection of refrigeration machinery. Small quantities of meat which are soft and decomposed, because of faulty stowage, do frequently come under the notice of inspectors and are condemned. Bone-taint, which is a particular type of decomposition, is now seldom met with in the ports at least. Occasionally, however, frozen meat has been contaminated by the fumes from oil fuel. This taint is most noticeable in the fat, but tends gradually to disappear in store, particularly if the coverings of the meat are removed. It haas been the practice to detain such tainted meat in store till no smell can be detected when the fat is rubbed in the warm hand or when fat portions of the meat are cooked by boiling.

Mr. W. S. DOUGLAS said the impression given by Mr. White's paper was the reasonableness with which inspection is carried out in the Port of London. One of the objections by butchers to public abattoirs was unnecessary strictness in inspection which, it was said, was enforced regardless of extenuating circumstances, but if inspection were carried out on the lines adopted by Dr. White in regard to imported supplies at the Port of London, such fears need not exist.

Solid Carbon Dioxide

Mr. J. RAYMOND said there was need for the legislation regarding refrigerated meat to be improved. For instance, he had recently heard that it had been discovered that under the Imported Meat Regulations, frozen meat which was rejected here might be sent out of the country and come back again in some other form. Could Dr. White, as Medical Officer for the Port of London, say whether that was the fact?

Dr. WHITE replied that although he did not know this as a fact it nevertheless was quite possible. In the case of prohibited meat it was not destroyed, but an export Order was served in respect of it and that meat could be taken out of the country and put into tin cans and sent here again without any possibility of rejection.

The next paper was " The Applications of Solid Carbon Dioxide " by Mr. F. Heywood. It was pointed out that the greatest advantage from the use of dry ice as a refrigerant and preservative in transport, demand that certain conditions be fulfilled by the vehicles or containers in which the goods are carried. Adequate insulation is, of course, a prime consideration, the economic thickness depending on the particular conditions. The lighter cellular types of insulation are to be preferred, as they allow pre-cooling to be carried out at a minimum of cost and permit advantage to be taken of the low conductivity of CO_2 by passing some or all of the gas evolved in the bunkers into the insulation, thereby increasing its efficiency and reducing the risk of moisture absorption. It has been found advantageous to line the refrigerated compartment with metal rather than wood to facilitate rapid cooling and this, on account of the ease with which such vehicles can be washed out, incidentally reduces the risk of bacteria and foul odours accumulating. Gas-tightness of the lining and doors is most important, not only from the point of view of efficient refrigeration, but in order that reasonably high CO_2 concentrations can be retained if desired.

By careful attention to door sealing, it is possible to obtain a high degree of gas-tightness. It has been found possible, for example, to maintain CO_2 concentrations of the order of 50 per cent. to 80 per cent. corresponding to dry ice evaporation rates of 6-12 lb. per hour in insulated containers of 300-400 cu. ft. capacity in use on certain British railways. Such high concentrations are usually unnecessary, but the tests show that beneficial concentrations should be obtainable with the much smaller evaporation rates normally required in practice. The ultimate extension of dry ice to refrigerated transport, particularly in hot countries, is necessarily bound up with the cost of the refrigerant.

Refrigerated Transport

The final paper on " Refrigerated Transport " was by Mr. H. W. Gaunt, who said the carriage of perishable foodstuffs offers to road transport illimitable scope for profitable development, but properly equipped vehicles are essential for this exacting work. To prevent deterioration in transit two types of vehicles have recently been built by the Duramin Engineering Co., Ltd. One is to carry 500 sheep or lamps in two tiers, or 10 tons of beef suspended from the roof hanging bars. One thousand cu. ft. of fresh air passes through the cargo every three minutes when these vehicles travel at 20 m.p.h. with the ventilators open, and when they are closed the very efficient insulation ensures that there is practically no temperature rise within twenty-four hours, which means that frozen or chilled goods are carried in perfect condition to their destination. The other vehicle is built primarily either

for fresh or frozen meat traffic. The body can be converted from an insulator to a ventilated van in a few minutes by opening the insulated hinged doors covering louvre openings fitted at the front and rear ends. Power-operated runways are provided within to facilitate quick loading and unloading of whole sides of beef, 10 tons of which can be legally carried suspended from the roof.

Referring to canal and river barge transport, the author said the only changes in the last 40 or 50 years have been in the material employed for insulation, although prior to that there were barges used for fish transport—where the cooling medium was bunkers of ice and salt set in the roof of the barge. Various insulating materials have been used including tow-hair, silicate cotton, charcoal, and granulated, but the present practice, which is subject to a Lloyd's survey, consists of alternate layers of 2-in. slab cork and tongued and grooved match-boarding on the sides and deck and 3-in. pitchpine, 2-in. cork and a further 2-in. pitchpine. The hatches are lined with 3-in. cork and the whole is covered with blankets and tarpaulins. Although the general transit time in these craft is generally of very short duration, it is estimated the frozen produce loaded into this type of craft would remain in good condition for 10 days.

Mr. SMITH asked what was the value of the goods carried in relation to the cost of Drikold as a refrigerant? The value of ice-cream he said was approximately £200 per ton and therefore it would easily bear the cost of such a refrigerant as dry ice. There were, however, many cases in which the value of the commodity would not stand such a high priced refrigerant.

Mr. GAUNT (who complained that owing to the arrangement of presenting the papers there had been no time for a discussion upon his, and expressed the hope that he would not on a future occasion be asked to waste an evening in presenting a paper there was not time to read) agreed that ice-cream stood in a special position as regards the use of such a refrigerant as Drikold and the facts with regard to that must not be taken as a guide to other people dealing with different commodities which had a lower value.

On the motion of Dr. J. T. Dunn, president of the Society of Chemical Industry, a hearty vote of thanks was accorded to the authors of the papers.

The Dyeing of Fleece or Shorn Lamb

By D. WOODROFFE, M.Sc., A.I.C.

SEVERAL firms of sheepskin tanners have for many years tanned shorn lambskins and marketed them for making up into a very comfortable slipper or mocassin. These shorn lambskins have a short white fleece about one-half inch in length and a moderately stout soft pelt. The pelt is tanned with a mixture of vegetable tanning materials, chiefly myrobalans and sulphited quebracho extracts, which are the chief ingredients of certain sheepskin tanning extracts. A demand has now arisen, however, for a coloured fleece and many leather dyers are experiencing difficulty in securing an evenly coloured fleece dyed to the roots. The problem is a twofold one. The wool must be dyed to its roots and the leather must not be spoilt. Ordinary wool dyeing methods are inapplicable because leather will not stand a treatment with boiling water. Moreover, the wool has not been scoured but only degreased and it does not readily take on the usual dyestuffs.

" Killing " the Wool

One method which has proved successful is the basis of certain processes of fur dyeing. The lambskins are first treated with acidified solutions of sodium or potassium bichromate. The chromic acid thus liberated, combines with the wool, and mordants it. Subsequently, the wool can be treated with a vegetable tanning or dyestuff and dyed with the usual coal-tar dyes. This method is only satisfactory if the wool has previously been " killed " by treatment with soda ash, milk of lime, ammonia or alkaline hydrogen peroxide. Such alkaline killing agents are very risky because they inevitably strip the tannage in the pelt. It is possible to employ them satisfactorily but the leather is so highly susceptible to alkaline solutions that they are best avoided.

The bichromate treatment proves highly satisfactory if it can be employed as a tannage. The writer has tanned raw sheepskins by the two-bath chrome tanning process and subsequently dyed them without any difficulty. The raw skins are first treated with a solution of 6 per cent. bichromate and 3 per cent. hydrochloric acid. After four hours drumming, they are left in the liquor overnight and next morning the chromic acid in the pelts is reduced to trivalent chromium salts, by means of hypo and hydrochloric acid. The skins are drummed with about 10 per cent. hypo in water and up to 9 per cent. commercial hydrochloric acid is diluted and added as required until the reduction is complete as shown by the bluish-green colour of the pelt. Another 10 per cent. of hypo is added and the drumming continued for some time and the skins left in the liquor overnight. The pelts thus treated will dye quite satisfactory if mordanted with a weak vegetable tanning extract or a natural dyestuff. Basic dyes can be used with every confidence and the wool will be dyed right through. Acid dyes will give lighter shades and the finished skins will be quite saleable.

The above method is particularly applicable to raw skins but many dyers and leather dressers have been supplied with shorn lambskins already vegetable tanned and the above treatment may not always be desirable. There is also a demand for very pale tints which are unattainable on a heavy chrome mordant. The dyeing of these vegetable tanned shorn lambskins is not a straightforward problem. Some dye assistant of a penetrating nature is required. Of all assistants on the market, the new sulphonated fatty alcohols have proved most effective. One firm of dyestuff manufacturers recommended the use of their special "fleece colours." These were dissolved to make a 0.02 per cent. solution. The necessary amount of fleece colour was pasted with a 10 per cent. solution of a sulphonated fatty alcohol, after which a small amount of hot to boiling water was added. The dyebath is then brought up to a temperature of 30° C. and the shorn lambskins immersed in the dye liquor for 1 hour without any addition, then washed and dried.

A large number of tests have been carried out in the laboratories of the College of Technology, Northampton, and some dyestuffs gave highly satisfactory results with the sulphonated fatty alcohols whilst others gave patchy dyeing or lack of penetration. Among the dyestuffs which proved satisfactory were Fast Red AG, Acid Bordeaux, Crocein Scarlet, Neolan Blue, Quinoline Yellow, Rhodamine B, Bismark Brown and Auramine, Bordeaux Extra Acid Brown.

The Institute of Chemistry

January Examination Results

THE Institute of Chemistry has issued the results of the January examinations as follows:

Examination in general chemistry for the associateship (pass list): Norman R. Hall, Central Technical College, Birmingham; Bert S. Harris, Birkbeck College, London; Ralph G. Harry, Technical College, Cardiff; John M. Kershaw, B.Sc. (Lond.), University College and the Technical College, Hull; Arthur A. Timmins, Central Technical College, Birmingham; Douglas G. Wallwork, A.M.C.T., College of Technology, Manchester, and Woolwich Polytechnic; John E. Welford, B.Sc. (Lond.), The Polytechnic, Regent Street, London.

A New Design in Rotary Vacuum Filters

Novel Features to Control Vacuum and Air Blow-Back Distribution

A ROTARY vacuum filter of new design embodying several novel features was introduced to the chemical and allied industries by Davey, Paxman and Co. (Colchester) Ltd., during 1933. This filter has already found a very wide range of applications and promises to give success in the solving of many difficult filtration problems. In bleach and dye works, for instance, it can be used for filtering caustic

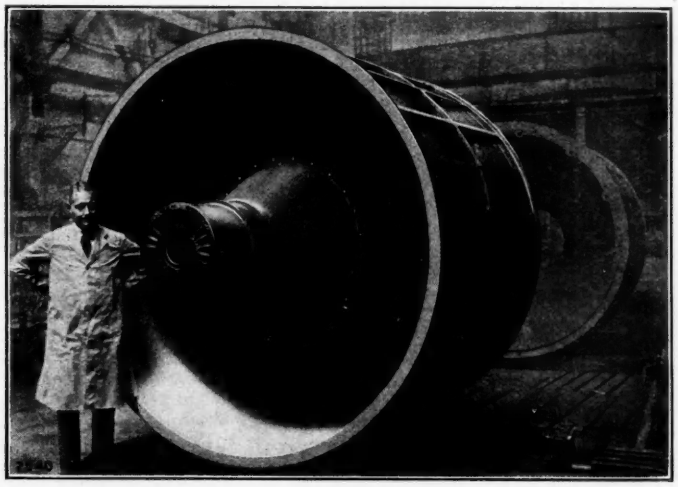


Fig. 1.—The Paxman Filter Drum, showing Cells or Compartments.

lime sludge at 18/20° Tw. and 80/90° C. direct from the causticiser, producing a clear filtrate and a thoroughly washed filter cake containing not more thanu 35/40 per cent. moisture and 0.5 per cent. free soluble soda. In cement plants it finds application for dehydrating lime, whiting or cement slurry. Here the recovered filter cake will contain in most cases some 20/25 per cent. moisture and can be discharged direct into the rotary kiln, thereby reducing fuel costs very considerably an dby the application of heat from the kiln gases, the moisture content of the filter cake can be reduced. At coal washery plants it can be used for recovering the

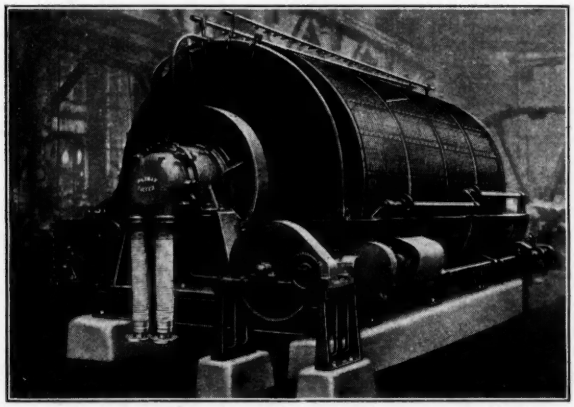


Fig. 2.—One of two very large Filters recently sent to Australia for dealing with Cyanide Gold Slimes.

small fine coal from washery slurry. In this case the moisture content of the recovered fines will depend to a considerable extent on the amount and nature of the clay present in the slurry, but will usually be in the neighbourhood of 18/20 per cent. total moisture, and in this condition the recovered coal can be discharged direct into wagons.

A further application for this filter occurs in the treatment of flue gas washing effluent, where the recovered solid matter, consisting of very fine fly ash with a small amount of carbonaceous matter, will be in a "just moist" condition so that it will not bank up in a bunker, and can be readily handled by hand or mechanically, whilst the filtrate will be quite clear and can be discharged into river, canal or drain without difficulty. In metallurgical practice it can be used for washing cyanide slimes or dewatering flotation concentrates, in gold, silver and copper plants; at paint and colour works for dehydrating fillers, pigment and colour slurries, also washing the recovered solid matter free from soluble acids

Fig. 3.—The Paxman Filter Valve-Head.

or alkalines; in the paper making industry for recovering fibre from backwater or whitewater, for washing excess bleach from sulphite stock, firstly with backwater and secondly with fresh water, for washing excess caustic from esparto pulp as discharged from the digestors, and for

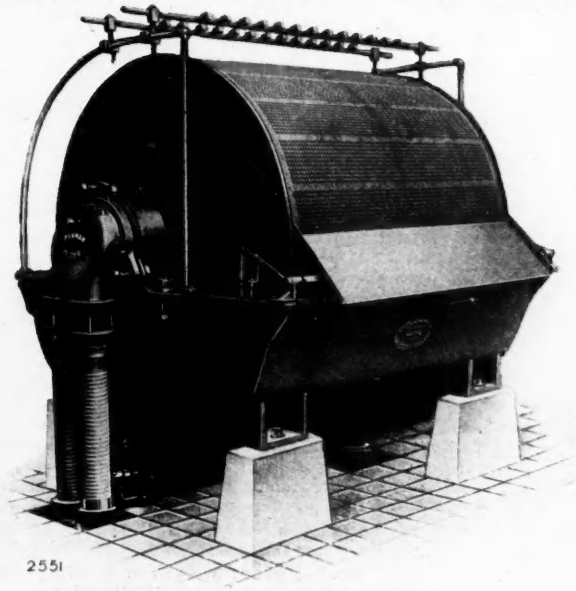


Fig. 4.—Paxman Filter, 70 sq. ft. capacity, showing the Perforated Filter Plate.

caustic lime mud washing. Such filters can also be very successfully applied for the clarification of the effluent discharged from beet sugar plants and for filtering cane sugar

muds. For the filtration of vegetable and edible oils it is advantageous to add a filter aid, such as keiselguhr or decolourising carbon, to the oils before filtration.

The filter drum (Fig. 1) is made of close-grained cast-iron and has a number of self-contained, vacuum and pressure tight cells or compartments cast in it. This drum and its cells can be lined with acid resisting rubber, or homogeneously coated by a special metallisation process with chemical lead, zinc, copper, or other metals to suit the characteristics of the slurry to be dealt with. A perforated filter plate is firmly secured to the face of the drum by means of countersunk screws, rubber, asbestos, sheet lead or other jointing material being used between the face of the drum and the underside of the perforated filter plate, to ensure a perfectly vacuum and pressure tight joint. The filter plate can be made of mild steel, monel metal, phosphor bronze or any other suitable metal. The filter medium upon which the filter cake builds up may be cotton or linen cloth, wool blanket, or metal gauze and is supported by the perforated metal filter plate. This filter medium is firmly secured to the drum by means of anchor bars and drum binding wire to entirely eliminate any possibility of leakages.

The drum is provided with one ported and one plain unported trunnion, the number of ports in the ported trunnion coinciding with the cells in the drum. The face of the ported trunnion is equipped with a readily removable face which can be easily taken off and skimmed in the lathe or scraped

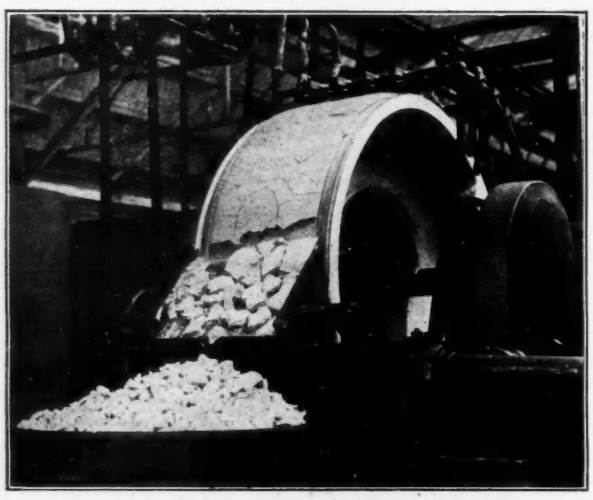


Fig. 5.—Paxman Filter handling Lime Mud.

up when desired. Both trunnions are usually made of cast iron or steel which can be coated with either rubber or homogeneously metallised to suit requirements. The drum and trunnions run at a very low speed, usually between ¼ and 1½ r.p.m. depending on the chemical and physical nature of the slurry being filtered, by means of a worm wheel securely keyed to the plain trunnion and a worm shaft which is usually operated by a pair of fast and loose pulleys, but other drives such as a chain drive or electric motor drive through a suitable reducing gear box can be provided if required.

In the slurry feed tank or trough a paddle-type agitator is normally provided, which can be operated at a suitable speed to ensure that the solids in the slurry are kept in suspension in the liquor, by a chain and a pair of sprockets, or it may be operated by an independent belt drive. When required, an oscillating type agitator can be provided, operated in a similar manner to the normal paddle-type agitator. The function of the valve head (Fig. 3) is to control the distribution of the vacuum and the air blow-back in the drum cells, that is, the number of cells open to the mother liquor, wash liquor or blow-back sections of the drum which can be readily varied to suit requirements. The normal valve head is of cast iron construction, but like other parts of the plant it can be constructed of antimonial lead or almost any other metal, or alternatively, it may be rubber lined or metallised on all parts coming into contact with the filtrate, to meet any particular conditions. It is kept absolutely vacuum and pressure tight on to the seat of the ported trunnion by means of three very accessible and readily adjusted springs which can be tightened or slackened while the filter is in operation.

The scraper or doctor knife for levering off the filter cake from the drum is fitted with a simple adjustment to keep the doctor edge truly up to the face of the drum. As a metal wire is used for securing the filter cloth or gauze to the drum the scraper is adjusted by means of the gear provided, to just touch the binding wire, accordingly, the possibility of the scraper damaging or cutting the filter medium is entirely removed. When the solids recovered are of a colloidal nature, a rubber-covered doctor roller is substituted for the normal scraper or doctor knife.

Chemical engineers and others who are acquainted with filtration problems will readily appreciate that no hard and fast rules exist as to the best method of filtering slurries, also that the chemical and physical characteristics of apparently similar slurries are sometimes considerably changed by minute variations in composition, temperatures and other conditions. Accordingly it is not possible to ascertain with any degree of accuracy what filtration results would be expected with any particular slurry without a test of the slurry under consideration. To enable the maker to formulate suitable recommendations as to the type of filter plant and equipment required to meet specific requirements, they have installed at their works a completely equipped Paxman filter plant and laboratory. This filter test plant and laboratory is at the entire disposal of interested parties. Such filtration tests will enable prospective users to witness the performance of Paxman filters with the slurry they provide, and at the same time enable the plant makers to obtain reliable working data.

A New Motor Spirit

Commercial Blend of Alcohol and Petrol

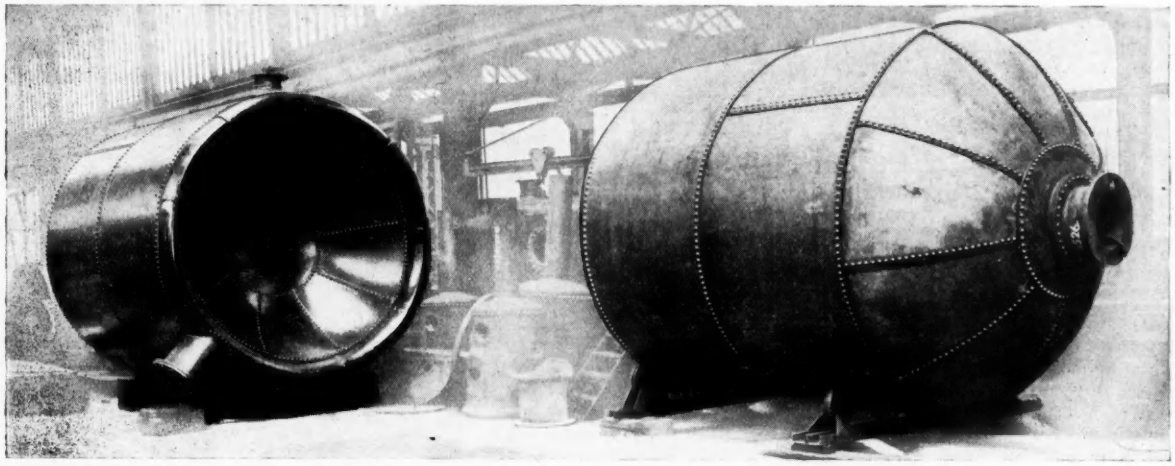
IN conjunction with the Distillers Co., the Petroleum Storage and Finance Corporation will shortly put on the market a new motor spirit—an alcohol-petrol blend—which will be sold under the name of "Cleveland Discol."

The announcement of the new spirit was made by Mr. E. A. Radford, presiding at the annual general meeting of the Petroleum Storage and Finance Corporation, in London, on January 30. The directors, he said, had been considering the sale of a premium spirit, to be sold at 2d. per gallon more than the price for Cleveland motor spirit, and affording a better margin of profit. In conjunction with the Distillers Co., and after exhaustive tests, they had finally produced an alcohol-petrol blend, to be sold under the name of "Cleveland Discol," which completely satisfied their technical staff as to its definite superiority in anti-knock value, easy starting, rapid acceleration and exceedingly smooth running.

For many years the Distillers Co. had, under the trade mark "Discol," been selling alcohol to the motor racing fraternity; in fact, alcohol-petrol blends were in wide and successful use in over thirty countries, including some of the British Dominions. It was proposed to commence active sale by Easter, and the directors looked forward to building up, as they had done with Cleveland motor spirit, a substantial and profitable sale for "Cleveland Discol" alcohol blend.

Edible Oil Products in South Africa

THE Vereeniging Oil and Maize Products and the United Oil Products, two important chemical organisations in the Transvaal, have now been amalgamated, and the new company formed as a result of this is known as the Consolidated Oil Products (Proprietary), Ltd., with Dr. Samuel Evans as the first chairman. A new factory is to be built in Johannesburg and the company intends to work this and the Vereeniging factory at full pressure, producing edible and lubricating oils, oils for other industrial purposes and for the production of cattle feed and fertiliser.



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Notes and Reports from the Societies

American Chemical Society

First Pittsburgh Award

THE Pittsburgh Section of the American Chemical Society has selected Dr. Ralph E. Hall, director of Hall Laboratories, Inc., as the recipient of the 1933 (the first) Pittsburgh Award. This honour, which will be conferred on Dr. Hall at the sectional meeting on February 15, has come to him in recognition of his distinguished service to chemistry, particularly his contributions to the fundamental knowledge of boiler water reactions and their applications to the practical solution of boiler water problems, his discoveries and technical accomplishments in the conditioning of all water supplies for industrial and domestic use, and his developments in the production of chemicals for these purposes. The award is in the form of a specially designed plaque of gold, on which the relation of chemistry to industry is symbolised artistically. In 1920 Dr. Hall became director of physico-chemical research at the Firestone Tire and Rubber Co. In 1921 he joined the research staff of the Koppers Company and was an Industrial Fellow of Mellon Institute for a year; in 1922 he went as physical chemist to the U. S. Bureau of Mines, where his notable researches into boiler-water problems began. He continued these productive investigations there until 1926, when he resigned to become director of Hall Laboratories, Inc.

Institution of Chemical Engineers

Annual Dinner

THE twelfth annual corporate meeting and annual dinner of the Institution of Chemical Engineers will be held at the Hotel Victoria, Northumberland Avenue, London, on Friday, February 16. At the meeting the president (Viscount Leverhulme) will deliver his address, and Professor C. H. Lander, D.Sc., will read a paper on "Modern Methods of Attacking Heat Transmission Problems." The president will preside at the annual dinner, and among the speakers will be Sir E. Hilton Young, M.P. (Minister of Health), and Lord Melchett.

Huddersfield Textile Society

Hydrogen Peroxide Bleaching

HYDROGEN peroxide bleaching was the subject of a paper read before a joint meeting of the Huddersfield Textile Society and the Huddersfield Section of the Society of Dyers and Colourists at the Technical College, on January 29. The author, Mr. H. Wilkinson, A.I.C., head of the dyeing department at the Technical College, Huddersfield, pointed out that hydrogen peroxide and peroxide bleaching are by no means new. It was discovered by Thenard in 1818 and first used in France in 1878 for bleaching silk. He had actually bleached silk yarn successfully on a works scale 35 years ago using a warm steeping process after neutralising with ammonia.

Hydrogen peroxide prepared by the modern electrolytic process has been available since the war and Mr. Wilkinson claimed a remarkable degree of stability for this product even when heated. He urged the revision of the old notion still to be found in chemical text books that hydrogen peroxide is an unstable liquid. He also pointed out that this stability disappeared in the presence of various mineral and organic contaminations, especially iron and copper, hence these metals should be avoided in the bleaching plant and guarded against in the water supply. Under certain conditions a very minute trace of copper can prevent bleaching altogether. Aluminium, on the other hand, is unaffected by peroxide solutions and has recently been introduced with success for bleaching plants. A detailed survey of the application of hydrogen peroxide to wool was then given, mentioning the ageing process whereby the goods are merely passed through weak hydrogen peroxide solution, piled overnight and finally dried. The cost of bleaching is greatly reduced by this process and excellent results have been obtained.

A special feature of the lecture was an explanation of the bearing of the views of modern physical chemistry on the important part played by buffer solutions in hydrogen peroxide bleaching. In stressing the need for careful control, Mr. Wilkinson said we are slowly beginning to realise that 100 per cent. production of 100 per cent. perfect goods can only be attained by the elimination of haphazard methods. If his listeners were among those who think that any way will do, he advised them not to try hydrogen peroxide. Carelessness and dirt were its arch enemies. Many, however, who are willing to apply to their work cleanliness and scientific methods are finding it an economical and satisfactory product for bleaching and similar purposes.

Institute of Fuel

Oil as an Ally of the Coal Trade

IN a paper on "Oil as an Ally of the Coal Trade," read before the members of the Institute of Fuel, in London, on January 25, Mr. Christopher Dalley claimed that not only is petroleum an ally of coal, but at one period was practically the saviour of the coal industry. He refuted the impression that petroleum and its products have caused unemployment in the mining industry.

It would be a calamity, after years of experimental work to produce reasonable quantities of petrol from coal, to find that petrol was no longer used as a motor spirit, said Mr. Dalley. With our present knowledge he believed it was even more difficult to obtain from coal oil the fuel suitable for the combustion ignition or heavy oil engine. In the past the prosperity of the coal industry was measured solely by the number of tons raised and sold, and the number of men employed. Viewed in the light of to-day's scientific activity, wherein energy from every ton of coal was more efficiently consumed, it was a fair statement to make that the past prosperity of the coal industry had been largely based on wast. It was an advantage to the world as a whole to obtain, from a ton of fuel, the maximum amount of energy human ingenuity could extract from it. The formation of a gas grid throughout this country on similar lines to the electricity grid would open up endless possibilities for the utilisation of coal in the form of gas. He thought they might see in the near future gas produced from coal *in situ*, and in this the petroleum industry, which had considerable experience of the transmission of large quantities of gas under high pressures over distances very much greater than were required to put a complete grid throughout the United Kingdom, could be of assistance.

Society of Glass Technology

Fundamental Reactions in Glass Manufacture

A MEETING of the Society of Glass Technology was held in the Coal, Gas and Fuel Industries Department, at Leeds University, on January 17, with the president, Mr. G.V. Evers, in the chair.

Further studies of the fundamental reactions in the formation of a soda-lime-silica glass were reported by Mr. R. F. R. Sykes and Professor W. E. S. Turner. In his introduction, Professor Turner referred to the study of the effect of heat on some glass-making materials alone, and then when heated together. He dealt with the effect of heat on calcium carbonate and sodium carbonate alone, then with the behaviour of the two-component mixtures, calcium carbonate-silica and sodium carbonate-silica. Calcium carbonate could be completely decomposed by heat alone at 610°, but sodium carbonate showed measurable decomposition only at temperatures approaching 1,000°. When mixed with silica, however, sodium carbonate lost all its CO_2 at temperatures as low as 390°. Increasing the proportion of silica increased the rate of decomposition. The decomposition of calcium carbonate was

accelerated by the addition of silica, but in this case the action was thought to be different in that no appreciable silicate formation was evident until temperatures above 1,000° were reached. It was suggested that silica, in this instance, acted as a catalyst, for a similar effect was obtained by use of gold and other chemically indifferent substances.

The application of statistical methods to the quality control of manufactured products, with reference to the planning of statistical tests, was the subject of a paper by Mr. B. P. Dudding and Mr. I. M. Baker.

The Faraday Society

Joint Meeting with Electrodepositors' Technical Society

A JOINT meeting of the Faraday Society and the Electrodepositors' Technical Society will be held at the Northampton Polytechnic Institute, St. John Street, London, on Wednesday, February 7, at 8 p.m. Dr. N. V. Sidgwick, F.R.S., president of the Faraday Society, will be in the chair. The following papers will be discussed:—"The Influence of Composition and Acidity of the Electrolyte on the Characteristics of Nickel Deposits" (D. J. Macnaughtan, G. E. Gardam, and R. A. F. Hammond); "The Effect of Annealing on the Microstructure and Mechanical Properties of Electrodeposited Nickel" (G. E. Gardam and D. J. Macnaughtan).

Hull Chemical Society

Recent Researches in Lubrication

RECENT researches on lubrication, with reference to the "boundary" film were discussed by Mr. J. E. Southcombe, M.Sc., technical director of Germ Lubricants Ltd., in a lecture delivered to the Hull Chemical and Engineering Society on January 23.

It was just fifty years, said Mr. Southcombe, since the first investigation on lubrication was published by B. Tower, upon whose experimental results O. Reynolds based the mathematical theory of fluid film lubrication. This theory presumes that a unidirectional cylindrical journal drags oil around with it in such a way that a pressure is developed in the oil film of varying intensity and the journal is lifted and separated from its bearing by this pressure film. Under these ideal circumstances the metals are kept from contacting and it can be shown that the film thickness is dependent on the viscosity of the oil, the speed, the load and the clearance ratio.

Although many experimental observations had demonstrated the general truth of the hydro-dynamic theory certain anomalies appeared to exist in practice and it became apparent that some extension of the theory was necessary to explain certain happenings, and about 1918 a serious attempt to gain more knowledge on the fundamentals of lubrication was commenced. Langmuir had just published his remarkable paper on mono-molecular films, Rayleigh and Hardy had commenced investigations on the influence of pure compounds as lubricants on static friction and Deeley had demonstrated that lubrication was dependent on some other property than viscosity. A discussion also took place at the Physical Society in London in 1919 and a Lubricant Inquiry Committee was set up by the Department of Scientific and Industrial Research. Just prior to this Wells and Southcombe had been studying the interfacial tension at oil-water surfaces and had noted that the addition of a trace of fatty acid to mineral oil reduced the interfacial tension and with dramatic insistence it also greatly improved the lubricating efficiency measured by the power of the treated oil to reduce the friction between rubbing metals. This discovery was patented in all countries and commercial oils for all lubrication requirements made by this method are now marketed under the trade name "Germ" oils.

Briefly reviewing some of the latest research which is being done on friction and lubrication it can be pointed out that in the first place the formation and maintenance of a fluid film is entirely dependent on a suitable balance of load and speed and certain types of motion. Under conditions where the speed is too slow for the load, the film is not formed or becomes broken—typical illustrations in engineering are reciprocating motion where the parts come to rest each stroke, rocking motion of pins and linkages and most important high temperature effects which reduce the viscosity of a lubricant to too low a value to support the load at a given speed. The break-down of the fluid film can be very simply shown by connecting an electric circuit containing a bell in series to a bearing on one side and to a rotating shaft on the other. When the shaft is rotating fast a thick layer of oil forms between it and its bearing and acts as an electric insulator and the circuit is broken but as the speed is reduced metallic contact starts to occur indicated by the ringing of the bell, and when the shaft is simply rocking to and fro in its bearing some metallic contact continuously takes place. When the conditions are those of fluid film lubrication viscosity is the dominating property of the oil but when this film breaks down we are dependent on another property to which the term "oiliness" has been given and the state of lubrication is then called "boundary," because it is a phenomenon of the boundary or interface between fluid and solid.

The surface layer of a solid, continued Mr. Southcombe, is the seat of unbalanced forces which manifest themselves as surface energy and are responsible in the ultimate for friction—the old idea of friction being caused by the roughness of the surfaces is only a half truth because very smooth surfaces sometimes show greater friction than comparatively rough ones. These surface forces can be more or less "saturated" by contamination films of certain fluids which can be manifest their presence by marked reduction of the friction between the solids which are thus coated with incredibly thin films—films whose thickness is of the order of a few dozen molecular diameters. A large number of organic compounds have been investigated by Sir William Hardy and his collaborators and it has been clearly established that the lubricating value of a fluid is dependent on the presence of polar molecules in the lubricant—an alcohol or a fatty acid for example is a much better boundary lubricant than its parent hydrocarbon.

Recently very careful measurements have been made of the adhesion of two solids between which is a thin film of organic matter and McBain and Lee state that the force field of the solid is transmitted through thin films of the adhesive 100 molecules or more in thickness and in general good boundary lubricants are bad adhesives. This is direct evidence that the solids exert their influence through a layer of lubricant many molecular diameters thick and the orientation of the first monomolecular layer on the solid is succeeded by further molecular layers of diminishing orientation extending away from the surface and this obviously suggests a specific and probably variable "structure" for the lubricating layer. When one component of the oil is capable of reacting chemically with another or of modifying its physical state, it affects the availability of the second component and on the other hand the molecules of one component may compete with the other for a place in the adsorbed layer in which case it affects the accessibility of the second component. Experiments carried out in the laboratories of Germ Lubricants, Ltd., by means of the Wells machine show that most commercial oils have a temperature coefficient which is reversible if the heating be stopped at a certain well defined point on the friction-temperature curve but heating above this temperature may cause irreversibility.

Society of Dyers and Colourists

Scottish Section: Textile Finishing on New Lines

AT a meeting of the Scottish Section of the Society of Dyers and Colourists held in Glasgow, on January 26, an interesting lecture on a new line in textile finishing was given by Dr. Alfred F. Kertess.

A novel feature of this lecture was the introduction of films which clearly instructed in a scientific manner, the progress in the knowledge and application of the sulphonated fatty alcohols, in the textile industries. The particular alcohols dealt with were the Gardinols. It was a well-known fact, said Dr. Kertess, that so far many of the textile auxiliaries were derived from a fatty acid; soap which is daily used in the household, as well as in textile factories can be applied for

all scouring and cleaning purposes, but with all its advantages the practical man knows that precautions are very necessary. With hard waters containing lime and magnesium salts, soap loses its efficiency and shows no cleaning action at all; to mention another disadvantage of soap, it separates immediately in presence of an acid. Much chemical research work was made in connection with those disadvantages, resulting in marvellous progress by the invention of the Gardinols, products which are now on the market as easily soluble paste and powders. Practically all problems of scouring are overcome by the use of these products irrespective of fibre or dye-stuff.

A film demonstrating various operations of practical scouring, bleaching, dyeing, printing, finishing and weaving, was shown, from which it could be seen that no elaborate changes in those practices were necessary to produce an improved appearance and handle of the most delicate textiles. Dealing with the physical properties of auxiliaries, pictures explanatory of surface tension were most attractively displayed.

Society of Chemical Industry

Birmingham and Midland Section

A LECTURE on "Ascorbic Acid and its Relation to Vitamin C," will be given, by Dr. E. L. Hirst, at a meeting of the Birmingham and Midland Section of the Society of Chemical Industry, to be held in the University Buildings, Edmund Street, on Thursday, February 8, at 7.30 p.m. The lecturer will trace the history of the discovery of ascorbic acid and its isolation from natural sources. He will also deal with the synthesis of ascorbic acid and of various analogous substances the biological activity of ascorbic acid and its relationship with the antiscorbutic factor (vitamin C). The meeting is open to all who are interested.

Institute of Metals

Scottish Section : Solidification of Metals

DR. SYDNEY W. SMITH read a paper on "Factors in the Solidification of Molten Metals" at a meeting of the Scottish Section of the Institute of Metals at Glasgow on January 15. Attention was directed to the importance of a knowledge of the physical properties of metals and alloys in the molten state and of their behaviour during solidification.

In the field of non-ferrous metallurgy, with which the paper was more immediately concerned, engineers are making more and more demands upon the metallurgist for enhanced physical and mechanical properties and for greater freedom from the possibility of imperfections. Increasing numbers of alloys are being manufactured and treated for industrial use as knowledge of the possibilities which lie in that direction becomes more generally recognised. At the base of all such work is the fact that the material must first be brought into a molten condition before it can be cast or moulded into the form in which it can be subsequently forged, machined or otherwise adapted to the purposes for which it may be required.

The physical properties of pure metals—cohesion, surface tension, liquid density, undercooling, change of volume, latent heat and crystallisation—were illustrated by a consideration of the manifestation of these properties during the solidification of a molten globule. The physical methods by which the liquid densities and surface tensions of metals and alloys have been determined were reviewed in some detail. Consideration was next directed to the miscibility of molten metals with a rising temperature and the varying degrees of miscibility which are met with in respect to this property. Reference was made to the relation which this behaviour appears to bear to the ratio of the molecular volumes of any particular pair of metals and the analogy which exists in the intermiscibility of ordinary liquids which do not react with each other chemically.

The behaviour of molten alloys was next considered when the temperature is falling. The possibilities of un-mixing or segregation were discussed. It was pointed out that while the success of smelting operations for the extraction of metals from their ores depends upon the completeness with which a separation of molten liquids can be effected, the successful preparation of alloys for industrial purposes depends largely upon preserving the uniformity of the distribution of the constituents which obtained in the molten condition.

The phenomenon of segregation during solidification was considered closely, first in relation to the behaviour of entectics and then in relation to those alloys which exhibit a range of solidification. That of eutectics solidifying at a constant temperature was illustrated by the cases of the silver-copper and alluminium-silicon eutectics. In the former case the marked effect on the properties as the result of varying the rate of solidification was indicated and in the latter case the profound changes brought about by the processes of so-called "modification" were discussed.

The phenomenon of "liquation" or "inverse segregation" in relation to alloys having a range of solidification was illustrated by its occurrence in silver and copper alloys.

Letters to the Editor

Dangers of Ethylene Glycol

SIR,—May I take this opportunity of correcting an impression that is to be derived from a sentence in your editorial comment on the British Celanese inquest which appeared in page 69 of THE CHEMICAL AGE last week, namely, that ethylene glycol and its derivatives appear not to have previously given rise to apprehension on physiological grounds?

It has been known for a long time that the prolonged ingestion of ethylene glycol must be harmful, since it has been shown that the products of metabolism are successively glycollic acid and oxalic acid. The well-known properties of the latter acid as a poison have much to do with the toxic action of ethylene glycol, and work in this country and the United States has confirmed this point of view, which is extremely important in view of the fact that ethylene glycol has been recommended in some quarters as a solvent for essences, etc. The metabolic end-product, oxalic acid, is also derived from the esters and ethers of ethylene glycol.—Yours faithfully,

G. MALCOLM DYSON,

Clifton Laboratories,
Albert Place, Loughborough.

Mustard Gas

SIR,—Speaking in his private capacity and not as chief research chemist of Imperial Chemicals Industries, on January 26, Dr. F. A. Freeth told the City of London branch of the League of Nations Union that chemical warfare had got such a hold on the imagination of the civilian population that the main danger was psychological. "If you found yourself in a gas raid and could keep your head sufficiently to close your windows, put out your fire and wait until the properly constituted authority had dispersed the gas, you would be reasonably safe," he said, adding that "if you had no duty to perform, and simply got into a hot bath, smoked a pipe and laughed, you would be practically completely safe. Nothing would happen unless the enemy scored a direct hit on you."

Dr. Freeth should think again! Major V. Lefebure, who was director of gas warfare on the Western Front, points out that "the effect of mustard gas on a wet skin is infinitely worse than on a dry skin. It takes an extremely small concentration of mustard gas to attack the skin, so in sitting in a bath with moisture on your face you would be courting blindness." Nor can much comfort be derived from Dr. Freeth's assurance that mustard gas is the only effective military gas, and that its value is now at an end because of completely defensive measures. It will be recalled that mustard gas was not originally a killing gas. There are still many people, 60 per cent. disabled as a result of it, but phosgene gas caused over 70 per cent. of deaths.

As Dr. Freeth said, there is a great deal of nonsense spoken about poison gas, but I might add that such nonsense is not confined to the columns of the Press. Statements which tend to make the public regard poison gas as a plaything rather than a menace, do not help towards eliminating the use of such an invention of the Devil.—Yours faithfully,

"DISARMAMENT."

News from the Allied Industries

Tanning

BARROW, HEPBURN AND GALE, LTD., the tanners and leather goods manufacturers, report a substantial increase in net profit for 1933 from £44,552 to £62,655. For the first time ordinary shareholders are to receive a dividend—one of 3 per cent. for the year—and the carry forward is raised from £22,480 to £36,760.

Artificial Silk

THE REDUCTION OF THE PREFERENTIAL TARIFF on acetate yarns for the purpose of breaking the monopoly now held by the Canadian Celanese Co. was advocated before the Tariff Board at Ottawa on January 29. The board was informed officially that the Cellulose Acetate Silk Co. of Lancaster was prepared to enter the Canadian market if the tariff were lowered. The present preferential rate is 25 per cent or 28c. a pound, whichever is the greater. The amount of reduction required by the British company is not stated, but the proposal before the board is to lower the tariff to 10 per cent. or 10c. a pound, whichever is the greater.

Non-Ferrous Metals

STATISTICS prepared by the International Tin Research and Development Council show that consumption of the metal in the past year was considerably larger than in 1932. The total is estimated at 127,000 tons, an increase of 27,000 tons, or approximately 25 per cent. Consumption, however, was about 16,000 tons below the average for the period 1923 to 1932, and 52,000 tons less than in the peak year 1929. The improvement compared with 1932 is largely due to American demand, the use of tin in manufacture in that country amounting to approximately 60,000 tons. In the previous year the total was no more than 40,600 tons. Consumption in the United Kingdom amounted to 19,964 tons, against 18,509 tons in 1932, an increase of 8 per cent. World production of tinplate also showed a notable improvement in the past year, the total being estimated at 3,200,000 tons, compared with 2,300,000 tons in 1932.

Glass

THE FLINT GLASS INDUSTRY of Stourbridge and Birmingham is making a much more vigorous start on the New Year's trading than it made twelve months ago. The range of products has been extended, and further developments are in contemplation. Good orders have been received mainly from buyers in this country for domestic and fancy glass, and there is also a fairly brisk demand for illuminating glass. Export business shows considerable improvement, but it is in the Dominions and Colonies that prospects appear to be the most promising.

Iron and Steel

A REPORT THAT THE IMPORTS ADVISORY COMMITTEE had issued an ultimatum to the National Federation of Iron and Steel Manufacturers, threatening to take away the 33⅓ per cent. tariff on imported steel unless the industry reorganised itself without delay, is said to be unfounded and incorrect.

THE LONDON IRON AND STEEL EXCHANGE held its annual dinner at Claridge's on January 30. Sir William Firth, chairman of the management committee, who presided, urged the need of Government control to rectify the uneconomic position of the industry, but Mr. Charles Mitchell almost entirely dissented from these views. Mr. Colville, secretary of the Department of Overseas Trade, proposed "The London Iron and Steel Exchange." Referring to the reorganisation of the iron and steel industry, he said that the Government were taking a close and sympathetic interest in it. It would appear that the best interests of the industry would be secured if the Government were taking a close and sympathetic interest in it. It would appear that the best interests of the industry would be secured if the Government refrained from participation at this stage, except the important assistance that had been given to the industry through the tariff behind which it was not possible to carry out reorganisation. He was confident that the skill and ingenuity of United Kingdom steel makers would not fail in the task of fitting themselves to meet competition.

Company Registrations at Somerset House

All Records Broken in 1933

THE year 1933 broke all records for the number of new companies incorporated in England, the total of 11,384 being reached. Of these, only 330 were public companies in the ordinarily accepted sense of the word and the remaining 11,054 were private companies. The following figures are extracted from statistics published by Jordan and Sons, Ltd., company registration agents, Chancery Lane, W.C.2:—

Classes.	Public Companies.		Private Companies.		Totals.	
	Number Registered.*	Capital. £	Number Registered.	Capital. £	Number Registered.	Capital. £
Cement, etc. ..	4	890,000	115	866,400	119	1,756,400
Chemicals ..	11	235,850	590	1,412,870	601	1,648,720
Engineers ..	6	1,395,500	614	3,351,915	620	4,747,415
Food	15	10,340,800	958	3,838,878	973	14,179,678
Glass and Pottery	—	—	57	196,600	57	196,600
Leather ..	2	30,500	85	249,954	87	280,454
Metals ..	2	25,000	130	1,291,595	132	1,316,595
Miscellaneous	34	95,200	240	374,116	274	469,316
Oil	2	300,000	90	236,100	92	536,100
Rubber ..	4	176,000	48	531,050	52	707,050
Others ..	250	26,368,445	8,127	42,338,783	8,377	68,707,228
Totals 1933) ..	330*	39,857,295	11,054	54,688,261	11,384	94,545,556
Corresponding figures in 1932	255	17,858,458	9,949	52,346,038	10,204	70,204,496

* In this column are included 80 "Companies Limited by Guarantee" and "Associations Not for Profit" without share capital, such companies being technically public however small the membership may be.

The capital figures are far from constituting a record, but they show an advance on those of 1932—especially in connection with "public" companies. The following shows the comparison:—

	Public. £	*Private.* £	*Total.* £
1933 ...	39,857,295	54,888,261	94,545,556
1932 ...	17,858,458	52,346,038	70,204,496
Increase	21,998,837	2,342,223	24,341,060

The average nominal capital of the 330 "public" concerns was £120,780, and that of the 11,054 "private" companies £4,947.

The figures for 1933 and those of the preceding years show that it is becoming more and more the practice for individual traders and partnerships to convert their businesses into "private" limited companies. Of the 11,054 "private" companies, a large number is represented by conversions of existing businesses. To this must be added the formation of private subsidiary companies by public companies, and the enterprise and initiative of those embarking upon new business as recovery is considered to be on the way. These figures may also tend to discount the theory that the day of the small individual business is over and that rationalisation and amalgamation have left no room for private enterprise.

Inventions in the Chemical Industry

Specifications Accepted and Applications for Patents

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Specifications Accepted with Dates of Application

KETONES, preparation.—W. W. Triggs (E. I. du Pont de Nemours and Co.). April 16, 1932. 404,643.

AZO DYESTUFFS, manufacture.—A. Carpmael (I. G. Farbenindustrie). June 11, 1932. 404,613.

ANALYSIS OF GASES, means for the.—London Power Co., Ltd., R. L. Rees and W. L. Richardson. June 13, 1932. 404,660.

FUEL OIL.—D. A. Howes and Imperial Chemical Industries, Ltd. June 21, 1932. 404,682

MINERAL ACID ESTERS of glucosides, production.—H. T. Böhme Akt.-Ges. Aug. 6, 1931. 404,684.

PRESSURE GAUGES.—J. Taylor and Imperial Chemical Industries, Ltd. July 12, 1932. 404,622.

ETHERS, production.—W. J. Bush and Co., Ltd., H. W. Vernon, and P. C. C. Isherwood. July 13, 1932. 404,687.

CONDENSATION PRODUCTS, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). July 13, 1932. 404,664.

CALCIUM HYPOCHLORITE, manufacture.—F. T. Meehan and Imperial Chemical Industries, Ltd. July 15, 1932. 404,627.

THERAPEUTICALLY-ACTIVE COMPOUNDS, manufacture.—W. W. Groves (I. G. Farbenindustrie). July 19, 1932. 404,674.

PURIFYING GASES, apparatus for washing.—Ateliers J. Hanrez Soc. Anon. May 31, 1932. 404,696.

REFRACTORY BLOCKS and masses resisting destruction by carbon, production and application.—Vereinigte Stahlwerke Akt.-Ges. July 27, 1931. 404,699.

AMINO COMPOUNDS, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). Aug. 4, 1932. 404,744.

CELLULOSE COMPOUNDS, manufacture and production.—Courtaulds, Ltd., and R. L. Wormell. Sept. 9, 1932. 404,759.

EXTRACTION OF SUGAR from sugar beet or other sugar-containing material.—J. C. Stead and H. W. K. Pears. Oct. 6, 1932. 404,769.

ORTHO-AMINOARYL-ALKYLSULPHONES, ortho-aminoaryl-aralkylsulphones, and azo dystuffs therefrom, manufacture.—I. G. Farbenindustrie. Nov. 24, 1931. 404,794.

GREEN FODDER, preservation.—I. G. Farbenindustrie. Jan. 22, 1932. 404,805.

DYESTUFFS, manufacture.—I. G. Farbenindustrie. June 24, 1932. 404,840.

VAT DYESTUFFS, manufacture.—I. G. Farbenindustrie. June 14, 1932. 404,867.

AZO DYESTUFFS insoluble in water, manufacture.—I. G. Farbenindustrie. June 17, 1932. 404,869.

PIGMENTS, processes for making.—American Zinc, Lead and Smelting Co. Aug. 10, 1932. 404,886.

Complete Specifications Open to Public Inspection

HYDROXY DICARBOXYLIC ACIDS, manufacture.—Standard Brands, Inc. July 18, 1932. 17794/33.

FINELY-DIVIDED METAL COMPOUNDS, method of making.—Chemische Werke Schuster and Welhelmy Patentverwertungs-Ges. July 21, 1932. 19948/33.

PLASTIC MASSES, manufacture.—I. G. Farbenindustrie. July 16, 1932. 20171/33.

CHROMIFEROUS DYESTUFFS, manufacture.—Soc. of Chemical Industry in Basle. July 19, 1932. 20280/33.

PROCESS for the manufacture of yellow acid sulphuric acid esters of leuco derivatives of vat dyestuffs.—I. G. Farbenindustrie. July 20, 1932. 20315/33.

CHROMIFEROUS DYESTUFFS, manufacture.—Soc. of Chemical Industry in Basle. July 20, 1932. 20379/33.

METALLIFEROUS DYESTUFFS, manufacture.—Soc. of Chemical Industry in Basle. July 22, 1932. 20380/33.

HARD SINTERED CARBIDE MATERIALS, production.—Siemens and Halske Akt.-Ges. July 19, 1932. 20382/33.

CARDIO-ACTIVE GLUCOSIDES from digitalic lanata, process for the manufacture.—Chemical Works, formerly Sandoz. July 22, 1932. 20618/33.

SAFETY PAPER and like materials, manufacture.—E. I. du Pont de Nemours and Co. July 22, 1932. 20880/33.

APPARATUS for the continuous distillation of magnesium.—Oesterreichisch Amerikanische Magnesit Akt.-Ges. Feb. 11, 1932. 1841/34.

Applications for Patents

WATERPROOF MATERIALS and their manufacture.—E. I. Du Pont de Nemours and Co. Jan. 15. 1437.

MANGANESE DIOXIDE, manufacture.—L. S. E. Ellis (Soc. des Usines Chimiques Rhône-Poulenc). Jan. 12. 1222.

ANODIC COATING of zinc base metals.—H. G. C. Fairweather (New Jersey Zinc Co.). Jan. 13. 1330, 1331, 1332, 1333.

CATALYTIC TREATMENT of mineral oils, etc.—C. J. Greenstreet. Jan. 15. 1422.

CONVERSION of coal distillation products into valuable hydrocarbons.—C. J. Greenstreet. Jan. 17. 1723.

TREATMENT of hydrocarbons.—A. W. Hayford, and J. S. Wallis. Jan. 11. 1126.

POLYMERISATION PRODUCTS of isobutylene, manufacture.—I. G. Farbenindustrie and J. Y. Johnson. Jan. 13. 1302, 1303.

COLOURING ORGANIC SOLVENTS, lacquers, etc.—I. G. Farbenindustrie and J. Y. Johnson. Jan. 12. (Germany, Feb. 25, '33.) 1200.

DYESTUFFS, manufacture.—I. G. Farbenindustrie. Jan. 12. (Germany, May 27, '33.) 1235.

PULVERULENT METAL ALLOYS, manufacture.—I. G. Farbenindustrie. Jan. 13. (Germany, Jan. 24, '33.) 1301.

STABILISING ANTIKNOCK COMPOUNDS in motor fuels.—I. G. Farbenindustrie. Jan. 15. (Germany, June 14, '33.). 1495.

ACID SAFRANINE DYESTUFFS, manufacture.—I. G. Farbenindustrie. Jan. 15. (Germany, Jan. 14, '33.) 1500.

ACID SAFRANINE DYESTUFFS, manufacture.—I. G. Farbenindustrie. Jan. 15. (Germany, Jan. 14, '33.) 1501.

ACID SAFRANINE DYESTUFFS, manufacture.—I. G. Farfbenindustrie. Jan. 15. (Germany, Aug. 11, '33.) 1502.

RUBBER, preservation.—Imperial Chemical Industries, Ltd. Jan. 11. 1086.

METALLIFEROUS AZO DYESTUFFS.—Imperial Chemical Industries, Ltd. and M. Mendoza. Jan. 12. 1249.

COUPLING COMPONENTS for insoluble azo dyes, manufacture.—Imperial Chemical Industries, Ltd., and W. A. Sexton. Jan. 16. 1571.

B-NAPHTHOL DERIVATIVES, manufacture.—Imperial Chemical Industries, Ltd., and W. A. Sexton. Jan. 17. 1677.

LIQUID HYDROCARBONS, production.—International Hydrogenation Patents Co., Ltd. Jan. 15. (Germany, Jan. 13, '33). 1373.

NITROGENOUS CONDENSATION PRODUCTS, manufacture.—J. Y. Johnson. Jan. 16. 1553.

SULPHURIC ACID, production.—H. Klencke, and Metallges Akt.-Ges. Jan. 12. 1194.

RECOVERING and refining magnesium, etc.—Oesterreichisch Amerikanische Magnesit Akt.-Ges. Jan. 16. (Austria, March 30, '33.) 1598.

SACCHAROSONIC ACIDS, etc., manufacture.—H. Ohle. Dec. 27, '33. (Germany, June 6, '33). 1630.

FILTERS.—J. A. Pickard. Jan. 11. 1136.

CARBONISATION OF COAL.—J. Roberts. Jan. 12. 1159.

RUBBER, manufacture.—P. Schidrowitz and R. M. Ungar. Jan. 17. 1727.

UNSULPHONATED AZO DYESTUFFS, manufacture.—Soc. of Chemical Industry in Basle. Jan. 12. (Switzerland, Jan. 16, '33). 1199.

MANUFACTURE of 1:4-diaminoanthraquinones.—Soc. of Chemical Industry in Basle. Jan. 17. (Switzerland, Jan. 18, '33.) 1683.

HEATING and fractionation of hydrocarbon oils.—C. W. Stratford. Jan. 12. 1232.

AZO DYESTUFFS.—H. Ackroyd, A. G. Green, A. Macmaster, and Williams (Hounslow), Ltd. Jan. 20. 2083.

SEPARATION OF LIQUIDS.—W. A. P. Challenor, F. A. F. Crawford and Imperial Chemical Industries, Ltd. Jan. 19. 2006.

PRODUCTION of liquid nitric esters.—W. A. P. Challenor, F. A. F. Crawford and Imperial Chemical Industries, Ltd. Jan. 20. 2080.

CONTROLLING oxygen content of copper-ammonia solutions.—Chemical Engineering Corporation. Jan. 20. (United States, March 7, '33.) 2085.

CHLORINATED RUBBER, production.—Chemische Fabrik Buckau. Jan. 23. (Germany, Feb. 20, '33). 2372.

HYDROXYBENZENES, manufacture.—R. G. Clarkson, F. B. Downing and E. I. Du Pont de Nemours and Co. Jan. 24. 2471.

ALGINIC ACID ESTER, production.—T. Gohda. Jan. 22. 2210.

DYESTUFF INTERMEDIATES, manufacture.—W. Cocker, Imperial Chemical Industries, Ltd. Jan, 22. 2244.

POLYNUCLEAR PHENOLS, manufacture.—E. I. Du Pont de Nemours and Co. Jan. 18. (United States, Jan. 19, '33.) 1800.

STABILISATION of liquid hydrocarbons.—E. I. Du Pont de Nemours and Co. Jan. 22. (United States, Jan. 20, '33.) 2173.

AZO DYESTUFFS.—E. I. Du Pont de Nemours and Co. Jan. 22. (United States, Jan. 21, '33.) 2174.

ALIPHATIC CELLULOSE ETHERS, production.—E. I. Du Pont de Nemours and Co. Jan. 24. (United States, Jan. 25, '33.) 2472.

METHOD of application of potentially thermo-setting phenol aldehyde condensation resins.—M. M. Freedland. Jan. 18. 1740.

MONOAZO DYESTUFFS, manufacture.—J. R. Geigy Akt.-Ges. Jan. 23. (Germany, Jan. 23, '33.) 2345.

REMOVAL of lead and cadmium from zinciferous materials.—T. B. Gyles and National Processes, Ltd. Jan. 22. 2223.

DIHYDRO-RESORCINOL, manufacture.—F. Hoffmann-La Roche and Co. Akt.-Ges. Jan. 19. (Germany, April 3, '33.) 1930.

WASHING OUT weak acids from gases.—I. G. Farbenindustrie and J. Y. Johnson. Jan. 18. 1832.

AZO DYESTUFFS, manufacture.—I. G. Farbenindustrie and J. Y. Johnson. Jan. 18. 1833.

ALKYL HALIDES, manufacture.—I. G. Farbenindustrie and J. Y. Johnson. Jan. 19. 1959.

LIQUID PRODUCTS from solid carbonaceous initial materials, manufacture.—I. G. Farbenindustrie and J. Y. Johnson. Jan. 22. 2194.

DYESTUFFS, manufacture.—I. G. Farbenindustrie and J. Y. Johnson. Jan. 22. 2195.

MANUFACTURE of masses containing metals in state of fine dispersion.—I. G. Farbenindustrie. Jan. 20. (Germany, Jan. 27, '33.) 2069.

CONVERSION PRODUCTS of ethylenes, manufacture.—I. G. Farbenindustrie. Jan. 22. (Germany, Jan. 20, '33.) 2228.

CONDENSATION PRODUCTS from phloroglucinol, etc., amines, manufacture.—I. G. Farbenindustrie. Jan. 22. (Germany, Jan. 20, '33.) 2181.

MONOAZO DYESTUFFS, manufacture.—I. G. Farbenindustrie. Jan. 23. (Germany, Jan. 24, '33.) 2392.

LIGHT HYDROCARBONS, production.—J. P. Imbert. Jan. 23. (United States, Jan. 23, '33.) 2272.

LIGHT HYDROCARBONS, production.—J. P. Imbert. Jan. 23. (Germany, Nov. 25, '33.) 2273.

PREPARATIONS for fat-liquoring leather, etc., manufacture.—Imperial Chemical Industries, Ltd., G. S. J. White and R. Greenhalgh. Jan. 22. 2243.

PRESERVATION OF RUBBER.—Imperial Chemical Industries, Ltd. Jan. 23. 2395, 2396.

SURFACE TREATMENT of ceramic materials.—Imperial Chemical Industries, Ltd., and R. Bennett. Jan. 24. 2512.

TREATMENT of carbonaceous materials with hydrogenating gases. International Hydrogenation Patents Co., Ltd., and H. E. Potts. Jan. 18. 1761.

BARIUM OXIDE, production.—Kali-Chemie Akt.-Ges. Jan. 23. (Germany, March 4, '33.) 2371.

CLARIFYING and preserving liquids containing colloids.—Katadyn Akt.-Ges. Jan. 19. (Germany, Jan. 19, '33.) 1941.

OXIDATION of isoaldehydes.—Naamlooze Vennootschap De Bataafsche Petroleum Maatschappij. Jan. 19. (United States, Feb. 3, '33.) 1988.

APPARATUS for continuous distillation of magnesium.—Oesterreichisch Amerikanische Magnesit Akt.-Ges. Jan. 18. (Feb. 2, '33). (Austria, Feb. 11, '32.) 1841.

APPARATUS for continuous distillation of magnesium.—Oesterreichisch Amerikanische Magnesit Akt.-Ges. Jan. 18. (Feb. 2, '33.) (Austria, Jan. 17, '33.) 1842.

CHROMIFEROUS DYESTUFFS, manufacture.—Soc. of Chemical Industry in Basle. Jan. 24. (Switzerland, Jan. 25, '33.) 2474.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

PRICES of industrial chemicals remain practically unchanged and there has been a fair amount of activity during the week. A good demand has been experienced for alkali, acetone, formaldehyde, oxalic acid, and salammoniac and large orders have been the subject of keen competition. Sales remain slow in the barium chloride market, and arsenic, copper sulphate, potassium bichromate, caustic potash and zinc oxide are dull. Some slight fluctuations in price are reported in the coal tar products section. There has been little change in pharmaceutical products, but the tone is steady and prices are maintained. A fair interest has been shown in essential oils. With the exceptions noted below, the prices of chemical products remain as reported in THE CHEMICAL AGE last week (pages 86-87).

LONDON.—Demand for chemical products continues of a satisfactory volume and markets are firm and show little alteration in prices. There is a noticeable tendency for buyers to cover their requirements ahead and the undertone is particularly strong. The coal tar products market remains firm, and prices are unchanged from last week.

MANCHESTER.—Whilst relatively weak spots are occasionally in evidence on the Manchester chemical market, the general run of products remains steady, and those users who are limiting commitments in the hope of being able to buy later on more advantageous terms are likely to be disappointed so far as the principal heavy materials are concerned. The demand during the past week has been on moderate lines, but, for the most part, transactions do not extend very far ahead. The alkali products, some of the potash and magnesium compounds, and the heavy acids are being called for in fairly steady quantities, mainly against existing contracts, but the uncertain outlook in the cotton trade is a discouraging influence. Among the tar by-products, a little more life has been in evidence in the pitch section and values have not further given way. Most of the light distillates meet with a fairly active inquiry, but in certain instances prices appear to be barely steady at the moment. A good trade is being done locally in carbolic crystals, current offers of which are on a firm basis.

SCOTLAND.—The Scottish heavy chemical market shows slight improvement with general business in current requirements only.

General Chemicals

ACID, OXALIC.—LONDON: £47 17s. 6d. to £57 10s. per ton, according to packages and position. SCOTLAND: 98/100%, £48 to £50 ex store. MANCHESTER: £49 to £53 ex store.

ACID, TARTARIC.—LONDON: 11½d. per lb. SCOTLAND: B.P. crystals, 11d., carriage paid. MANCHESTER: 1s.

BARIUM CHLORIDE.—£11 per ton.

LEAD ACETATE.—LONDON: White, £34 10s. per ton; brown, £1 per ton less. SCOTLAND: White crystals, £33 to £35; brown, £1 per ton less. MANCHESTER: White, £34 to £36; brown, £31 10s.

PHENOL.—8¼d. to 9d. per lb. without engagement.

POTASSIUM PERMANGANATE.—LONDON: 8¾d. to 9d. per lb. SCOTLAND: B.P. crystals, 9d. MANCHESTER: Commercial, 8¼d. to 8¾d. according to quantity in 2-cwt. drums; B.P. 9d. to 9¾d.

POTASSIUM PRUSSIATE.—LONDON: 8½d. to 8¾d. per lb. SCOTLAND: Yellow spot material, 8½d. ex store. MANCHESTER: Yellow 8½d.

SODIUM NITRITE.—LONDON: Spot, £18 to £20 per ton d/d station in drums.

SULPHATE OF COPPER.—MANCHESTER: £15 10s. to £16 per ton f.o.b.

Pharmaceutical and Fine Chemicals

MENTHOL.—A.B.R. recryst B.P., 12s. per lb.

AMYL CINNAMIC ALDEHYDE.—8s. per lb.

COUMARIN.—11s. per lb.

ISO EUGENEL.—8s. per lb.

LINALOL (ex Bois de Roce).—7s. per lb.

LINALYL ACETATE (ex Bois de Rose).—8s. per lb.

VANILLIN (ex Clove Oil).—14s. 3d. to 16s. 3d. per lb.

Essential Oils

LAVENDER.—Mont Blanc, 38/40%, 14s. 9d. per lb.

SANDALWOOD.—Mysort, 20s. per lb.; English, 25s. per lb.

Coal Tar Products

ACID, CARBOLIC.—Crystals, 8½d. to 8¾d. per lb.; crude, 60's, 2s. 4d. to 2s. 5d. per gal. MANCHESTER: Crystals, 9d. per lb.; crude, 2s. 4d. per gal. SCOTLAND: 60's, 2s. 6d. to 2s. 7d.

PYRIDINE.—90/140, 5s. 9d. to 6s. 6d. per gal.

TOLUOL.—90%, 2s. 8d. per gal.; pure, 3s.

XYLOL.—Commercial, 2s. 6d. to 2s. 7d. per gal.; pure, 2s. 9d. to 2s. 10d.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—Home, £7 5s. per ton; export, nominal, £6 3s. 9d. f.o.b. U.K. ports in single bags.

CYANAMIDE.—£7 4s. per ton, carriage paid to railway station.

NITRATE OF SODA.—£7 18s. 6d. per ton nearest station.

From Week to Week

MR. R. G. JOHNSTON, Ph.D., has been appointed demonstrator in chemistry in the United College University of St. Andrews.

THE BRITISH CYANIDES CO., LTD., has removed its offices to 1 Argyll Street, London, W.1.

MR. ERNEST GRIFFITHS JONES, M.Sc., F.I.C., chief chemist to the Department of Public Health, Egyptian Government, has died at Cairo, after a very brief illness, aged 44.

ADDITIONAL BLAST FURNACES at the Gartsheerie Ironworks of Wm. Baird and Co., Ltd., are to be relit. At the moment the number of furnaces in operation in Scotland amounts to ten.

NOTICE WAS GIVEN in the "London Gazette" of January 23 of the voluntary winding up of the Deanbank Chemical Co., Ltd. Mr. J. W. Watson, of 2 Tubwell Row, Darlington, has been appointed liquidator.

THE PARTNERSHIP between George H. Wilson and John E. Atherton, carrying on business as chemical manufacturers under the name of the Muvit Manufacturing Co. has been dissolved. Mr. Atherton will carry on the business under the existing name.

DORMAN LONG AND CO. are relighting another blast furnace which has been idle since the end of August, 1931, at its Redcar ironworks, North Yorkshire. The coke-oven plant at Redcar has also just been restarted after two and a half years' idleness.

DUNDEE GAS COMMITTEE have been authorised to spend £7,500 on installing a crude benzol recovery plant at the city gas works. The estimated annual production of benzol is 214,173 gallons, and the estimated annual profit is £3,450.

THE SCOTTISH CO-OPERATIVE WHOLESALE SOCIETY, LTD., Soap Works, Grangemouth, have applied to the Town Council of Grangemouth for permission to erect a fat melting and rendering business near Grangemouth Docks. The application will be considered by the local authority on February 19.

THE RELATIVE MERITS OF OIL AND COAL as fuel were brought before members of the Chemical Section of the Manchester Literary and Philosophical Society on January 23. The case for oil was presented by Mr. J. Galloway Walthew, of Crossley Brothers, and that for coal by Mr. H. T. Williams, lecturer on mining at Manchester University.

CHANGES OF ADDRESS have been notified as follows:—Mr. T. Lewis Bailey (Felcourt, East Grinstead) to 93 Demesne Road, Wallington, Surrey; Mr. H. A. S. Gothard, consulting engineer, to Kimberley House, 14-17 Holborn Viaduct, London, E.C.1 (telephone City 1746); and Mr. W. Hanneford-Smith ("Thurloe," The Avenue, Gravesend) to "Cornerways," 1 The Avenue, Gravesend, Kent.

THE JOINT ANNUAL CONCERT organised by the Institute of Chemistry, the British Association of Chemists, and the Society of Chemical Industry (Local Sections) will be held at the Midland Hotel, New Street, Birmingham, on Monday, February 19, at 7.15 p.m. Tickets can be obtained from the hon. secretaries, Dr. F. W. Norris, 91 Witherford Way, Selly Oak; Mr. R. A. V. Tayar, 23 Wheatsheaf Road, Edgbaston, or from any member of the committee.

THE CALICO PRINTERS' ASSOCIATION has designed and constructed an artificial sunlight lamp for testing the resistance or "fastness" of dyed materials to varying conditions of humidity and temperature. In addition to a light source which resembles that of other types of carbon arc lamps, this lamp has in front of it a double glass screen with water circulating between the glasses. Temperature and humidity can be controlled so that when the samples are enclosed in the exposure chamber surrounding the arc such conditions can be reproduced as are common to the various climates in which the fabrics are intended to be used. The lamp has been installed at the Manchester Chamber of Commerce testing house and the Society of Dyers and Colourists will recommend it in its Fastness Tests Report.

SIR HARRY MCGOWAN, chairman of Imperial Chemical Industries, Ltd., made some outspoken comments on Japanese competition when addressing the Birmingham Jewellers' and Silversmiths' Association, at its annual banquet on January 27. He said he had just returned from the Far East, where he made a study of industrial conditions. Japanese competition was largely due to currency depreciation, and we had been outbid in competitive exchange depreciation. He confessed that Imperial Chemical Industries were getting in touch with their opposite numbers in Japan in an endeavour to make arrangements for them to retain a share of the Japanese market and for the control and direction of export trade in competitive markets, on a mutually satisfactory basis. He recommended this policy to all manufacturers in England who were prejudiced by the export of Japanese goods not only to this country, but to other export markets where they had been doing business for years past.

AN ALLOWANCE of £2 10s. per ton in the price of glycerine, dating from February 1, is announced by Glycerine, Ltd.

MR WALTER ADDISON DE BOIS MACLAREN, editor of the "India Rubber Journal," who died on November 22, 1933, left estate to the value of £7,741, with net personalty of £4,576.

MR. JOHN PATERSON CROSBIE has died at his residence, Standfield House, Sheffield. He was a director of Hadfields, Ltd., for 18 years, and had been associated with the company for 40 years.

WILLIAM MUIRSMITH, of Edinburgh, head of A. B. Fleming and Co., Scottish Printing Ink Factory, Granto, has left personal estate in Great Britain amounting to £87,327.

INCLUDED IN A LIST OF BENEFACTIONS to the University of St. Andrews is £100 from Imperial Chemical Industries, Ltd., towards the cost of chemical research.

SIR FRANK BAINES, F.R.I.B.A., architectural and constructional consultant to Imperial Chemical Industries, Ltd., who died on December 25, 1933, aged 56 years, left estate of the gross value of £65,826, with net personalty £808.

MR. P. T. HOLLIGAN, of the Imperial Chemical Industries Research Department, gave a lecture on "Bright Annealing in Nitrogen-Hydrogen Gas" at a recent meeting of the Sheffield Metallurgical Association.

TWO SUPPLEMENTARY VOLUMES of Thorpe's "Dictionary of Applied Chemistry," will shortly be published. The present editors, Professors J. Thorpe and M. A. Whiteley, have preserved continuity and the traditional connection of the "Dictionary" with the Royal College of Science.

NOTICE OF INTENDED LIQUIDATION DIVIDENDS by Waste Food Products, Ltd., of 3 London Wall Buildings, E.C., appeared in the "London Gazette," of January 26. The last day for receiving proofs is February 12. The liquidator is Sir William H. Peat, 11 Ironmonger Lane, E.C.

THE DATE OF THE ANNUAL DINNER and dance of the Oil and Colour Chemists' Association has been altered to Monday, March 19. It will be held in the Empire Suite of the Trocadero Restaurant, Piccadilly Circus, London, as previously announced. The chief guests will be Sir Richard Gregory and Sir William Bragg.

MR. F. W. HAMPSHIRE, a leading philanthropist in the Midlands and the North and chairman and managing director of F. W. Hampshire and Co., Ltd., manufacturing chemists, of Derby, has promised a gift of £35,000, spread over seven years, towards the fund which University College Hospital, London, is raising in celebration of its centenary.

THE FIRST STATUTORY MEETING of the new Nitrate and Iodine Sales Corporation was held at Valparaiso on January 29. All British, American and Chilean interests, which have notified their adherence to the corporation, were represented. Don Gustavo Ross, the Finance Minister, was elected president of the corporation and Señor Joaquin Irarrazaval, a representative of the Lautaro Nitrate Co., Ltd., was elected vice-president.

A CASE INVOLVING SEVERAL MILLION POUNDS is now before the Turkish Commercial Court at Istambul. Evidence is being taken at the request of the British High Court in connection with a lawsuit as to the validity of the concession for the extraction of salts from the Dead Sea. The right of the Palestine Potash company to extract the salts is challenged by a group of French capitalists. Up to the present Palestine Potash has spent £750,000 on plant, and has laid down 600 acres of concrete pens for evaporation purposes.

IT HAS RECENTLY BEEN STATED by an official of Imperial Chemical Industries that the first supplies of petrol hydrogenated from British bituminous coal at the new works at Billingham-on-Tees will possibly be available by the end of the year. Last July, I.C.I. estimated that eighteen months would be occupied from that date in completing the plant. It is now expected that this schedule will be overtaken, and that the works will be ready for production in less than twelve months. For some months gangs of men have been preparing the foundations, and in the meantime the necessary steel work has been under construction. Commenting on the fact that the work of erecting the plant has begun, the "Petroleum Times" says that it marks a great step towards the fuller utilisation of Great Britain's power resources. It also marks the birth of a new industry, which may grow to great proportions. "Although the crude oil in sight from proved fields may prevent the prices of products being very appreciably higher for many years, and while none can fortell what stores of oil the new fields of Iraq and Russia will yield, at least the hydrogenation industry will give this country a much stronger starting point for expansion in case of grave national emergency."

SIR WILLIAM BATE HARDY, the Cambridge scientist, who died on January 23 at the age of 69, was one of the leading biologists of the country. He was Director of Food Investigation of the Department of Scientific and Industrial Research, and for some time he had been secretary of the Royal Society. Four years ago he was president of the British Association of Refrigeration.

IMPORTS OF CHEMICALS AND CHEMICAL PRODUCTS (excluding fertilisers) into the Irish Free State in November, 1933, were valued at £97,903, as compared with £96,732 in the corresponding period of last year. The value of chemical fertilisers imported in the month under review was £32,260, as against £19,116 in November, 1932.

THE IRISH FREE STATE has announced that five distilleries for the production of industrial alcohol are to be built in the counties of Louth, Monaghan and Cavan, together with one rectifying plant to complete the unit. These distilleries will all be in large potato-growing districts. It is stated that German and Czecho-Slovakian companies will be tendering for the supply of equipment.

A COURSE OF TWO LECTURES will be given at University College, London, by Professor Dr. L. Ruzicka, professor of organic chemistry in the Technical High School, Zurich, on February 27 and March 1, at 5.30 p.m. The first lecture will be devoted to the "Many-Membered Carbon Rings"; the second lecture to the "Constitution of the Sesqui-and Diterpenes." At the first lecture the chair will be taken by Professor C. K. Ingold, D.Sc., F.R.S., professor of chemistry, London University. Admission will be free, without ticket.

THE DUKE OF YORK, as president of the Industrial Welfare Society, visited the Battersea Works of the Morgan Crucible Co., Ltd., on January 30. He spent an hour or more watching the processes in the manufacture of plumbago crucibles and heat-resisting ware. He was conducted on his tour by Mr. W. F. Coaker and Mr. G. W. Edward, directors of the firm, Mr. S. C. Ramsay, works manager, and Mr. Robert R. Hyde, director of the Industrial Welfare Society. A number of works officials were wearing somewhat battered straw "boaters," and it was explained to the Duke that this custom dated back for about 30 years. Such headgear was found to be very suitable as a protection against the dust of the factory.

Company News

Broken Hill South, Ltd.—A dividend of 7½ per cent. is announced, payable in Melbourne on March 16.

Barrow, Hepburn and Gale.—An ordinary dividend of 3 per cent., less tax, has been declared for the year 1933, payable on February 10.

American Smelting and Refining Co.—A dividend of $2.50 has been declared on the 7 per cent. first preferred shares, payable on March 1.

The South Metropolitan Gas Co.—A final ordinary dividend of 3½ per cent., making 6 per cent., less tax, for the year 1933, has been declared.

Chemical Bank and Trust Co., New York.—The statement of condition on December 30, 1933, show capital, surplus and undivided profits $67,490,327, deposits $327,395,669, and total assets $447,711,481.

Gas Light & Coke Co.—The usual half-yearly payments on the 4 per cent. preference and 3½ per cent. maximum stocks, are announced, and an ordinary dividend of 2 4/5 per cent., again making 5 3/5 per cent. This rate has been maintained since 1928.

Canadian Industrial Alcohol.—For the year ended September 30, 1933, the trading profits amounted to $198,500, compared with a trading loss of $10,250 during 1931-32. After deduction of bank interest amounting to $157,000, carrying charges on non-operating plants totalling $51,000, and inventory adjustment $12,000, the net loss was $21,500.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Canada.—A recently-established manufacturers' agent in Montreal is desirous of obtaining the representation of United Kingdom manufacturers of lubricating oils (marine and industrial), Diesel oil, greases, etc. He is prepared to work on a commission basis and cover the provinces of Quebec and Ontario. (Ref. No. 112.)

Norway.—A firm of agents established at Oslo wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of laboratory equipment. (Ref. No. 134.)

Brazil.—A recently-established firm of commission agents in Rio de Janeiro desires to obtain the representation of United Kingdom exporters of industrial chemicals, etc. (Ref. No. 140.)

Questions and Answers

Readers are invited to co-operate in supplying information on the subjects of the queries raised under this heading. Replies should be addressed to the Editor, THE CHEMICAL AGE, quoting the reference number.

207.—SPRAYING MACHINES.—Could you give us the names and addresses of any makers of machines for spraying warm petroleum jelly?

We have forwarded to our correspondents the names and addresses of makers of spraying machines, but should welcome further information from firms manufacturing equipment especially designed for such purposes, having regard to the need for keeping the material warm to prevent it from solidifying.

208.—CALCIUM TARTRATE.—Friends in Chile require information regarding the disposal of calcium tartrate in this country. They desire to know whether there is a demand for this product, and, if so, the names of likely users.

Forthcoming Events

Feb. 5.—Chemical Engineering Group. "The Recovery of Benzol by Activated Carbon." H. Hollings and S. Hay. 8 p.m. Burlington House, London.

Feb. 6.—Hull Chemical and Engineering Society. Joint meeting with the Guild of Building and the Yorkshire Branch of the Institute of Structural Engineers. "Notes on the Building Stones, their Decay and Preservation." A. R. Warnes. 7.45 p.m. Grey Street, Park Street, Hull.

Feb. 7.—British Wood Preserving Association. "The Use of Treated Timber in Railway Stock." W. H. Brown. 6 p.m. 29 Lincoln's Inn Fields, London.

Feb. 7.—Society of Public Analysts. Joint meeting with the Food Group of the S.C.I. "The Analysis of Fruit and Fruit Products," E. B. Hughes and Miss A. E. Maunsell. "The Examination of Fruits and Jams by Lead Precipitation." C. L. Hinton. 8 p.m. Burlington House, London.

Feb. 7.—Institution of the Rubber Industry (West of England Section). "The Rubber Trade in Retrospect." B. D. Porritt. Town Hall, Trowbridge.

Feb. 7.—The Institute of the Plastics Industry (London and District Section). "British Standard Specifications with Particular Reference to Electrical Mouldings." W. D. Owen. Windsor Castle Hotel, Victoria, London.

Feb. 7.—Faraday Society and Electrodepositors' Technical Society. Joint meeting. Discussion of papers on "The Influence of Composition and Acidity of the Electrolyte on the Characteristics of Nickel Deposits." D. J. Macnaughtan, G. E. Gardam, and R. A. F. Hammond. "The Effect of Annealing on the Microstructure and Mechanical Properties of Electrodeposited Nickel." G. E. Gardam and D. J. Macnaughtan. 8 p.m. Northampton Polytechnic Institute, St. John Street, London, E.C.1.

Feb. 8.—Society of Dyers and Colourists (London Section). Joint Lecture with the Textile Institute. "Recent developments in Dyeing."

Feb. 8.—Society of Chemical Industry (Nottingham Section). "Chemical Education in Germany: a Comparison." Dr. E. B. R. Prideaux. 7.30 p.m. University College, Nottingham.

Feb. 8.—Society of Chemical Industry (Birmingham and Midland Section). "Ascorbic Acid and its Relation to Vitamin C. Dr. E. L. Hirst. 7.30 p.m. University Building, Edmund Street, Birmingham.

Feb. 8.—Oil and Colour Chemists' Association. "Thixotropy." J. Pryce Jones. 7.30 p.m. 30 Russell Square, London.

Feb. 8.—Institute of Metals (London Section). "Electric Annealing and Heat-Treatment Furnaces." A. G. Lobley. 7.30 p.m. 83 Pall Mall, London.

Feb. 9.—North of England Institute of Mining and Mechanical Engineers. Annual dinner and dance.

Feb. 9.—The Chemical Society. "Diamonds." Sir Robert Robertson. 7.30 p.m. Royal Technical College, Glasgow.

Feb. 9.—Oil and Colour Chemists' Association (Manchester Section). "Gas Black—Its Manufacture and Application." Dr. W. J. S. Naunton and Dr. F. J. Siddle.

Feb. 9.—Institute of Metals (Sheffield Section). "Recovery and Refining of Precious Metals." H. G. Dale. 7.30 p.m. University, Sheffield.

Feb. 9.—Andersonian Chemical Society. "Aloes and its Constituents." E. J. Schorn. 3 p.m. Royal Technical College, Glasgow.

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